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**How To
Use Hinges**

**Balsa USA
EAA BIPE**

**WARBIRD
BASH!**

**Build a
HOTS BIPE!**

**Design
Contest
Finalists!**

**Radio Control
Action!**

**Canadian
Jet Rally**

**Kyosho
Electric ROBIN**



MODEL AIRPLANE NEWS



ON THE COVER: The full-scale and radio-control worlds collide on this month's cover: two Skyraiders flying over Titusville, Florida, an R/C F-14, Kyosho's new electric Robin, and an R/C enthusiast flying a Great Planes CAP 21. Skyraider photo by Budd Davisson; others by Rich Uravitch.

ABOVE: Two Mustangs flying in formation caught by Budd Davisson's camera. See story on page 66.

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MODEL AIRPLANE

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Editorial

by RICH URAVITCH



CREATIVITY, ORIGINALITY—that's what this sport is all about! I've always felt that aeromodelers in general were an ingenious group of folks who, perhaps because of circumstances, never made their mark in Big aviation—but surely could have.

The Voyager team members, including Bert and Dick Rutan, were avid modelers during earlier times. Paul Poberezny, the head man at the Experimental Aircraft Association, also built models for a long time—he still does—only the ones now are a lot bigger! Since I'm writing this editorial from Oshkosh '87 and am surrounded by home-built airplanes (many of which are original designs), the similarity between full-scale and model design elements becomes increasingly evident.

We received 408 entries in our Design Contest. The narrowing-down process was difficult and included many discussions along the way for each and every entry. The 50 finalists in this issue represent the efforts of modelers just like yourself and run the entire gamut—from sport to scale, glider to amphibian—and come from all over the world.

To the 358 of you whose entries *do not* appear on these pages, don't be too disappointed. I just talked with a guy who never won any contests with his model Canard a few years ago...I think his name is Rutan....

We'd like you to vote for your favorite designs by using the official ballot in this magazine. To sweeten the pot, every official ballot received will be entered into a drawing for a Kyosho Planet, a Fox engine, and a two-year subscription to *Model Airplane News*—not bad for a 22-cent investment!

In the words of two famous old men, "Thank you for your support." ■



Airwaves

The Land of Small Steps

I'm very happy to see *Model Airplane News* give the modeler more information in the form of "Small Steps." I began modeling in the 1930's and my first new engine was an OR 19, which I ran to death.

You've asked what we would like to see in your column. I would love more information on 1/2A planes, kits and accessories. Also, I'd like to see more articles about old timers, scale, pushers, odd designs, flying wings, multi-engines, etc. I once converted an old Goldberg Ranger 10 to a multi-engine 049 Medalion R/C Tee Tail. I'd like to know the whereabouts of suppliers for 1/2A parts, accessories and kits. How 'bout the availability of plans/kits like the Storm Petrel, Starling, Cloud Buster, etc., or just about anything in 1/2A. I enjoy 1/2A because they're economical to buy and fly, easy to transport, and just plain fun. Keep up the good work.

ROBERT CLINE
Foroyar Via, Denmark

South of the Border

A masterpiece, truly a masterpiece! Your May '87 issue of *Model Airplane News* was superb! I just loved this issue: the 40s shoot-out, the Red Hawks, Mr. Chinn's column: spectacular! Bravo, to the staff at *Model Airplane News*.

I live in Mexico and my club is called The Air Knights R/C Club (formerly Club Aeromodelismo de Toluca). This club is more than 15 years old and has a new name and a brand-new flying field. My club's main interest is R/C (all types and sizes), but there's a small group dedicated to FF and UC. Our flying field is part of a little town, Mexicaltzingo, and so I have been creative and designed a couple of my own planes, the Mex-Zing No. 1 and No. 2 (pattern ships and a Chipie trainer).

In order to maintain interest, we have regular contests every few months and a

big contest every year. Last year, our popularity grew considerably as a result of two TV interviews and a report in "El Panorama," a monthly journal of Mexicaltzingo.

Here's an invitation to contact my club and exchange plans, hints, tips, etc. And if you ever come to Mexico, stop and pay us a visit. For more information contact: Caballeros del Aire R/C Club, Lista de Correos Suc. F, Toluca, Mex., 50000 Mexico.

EDUARDO ESPEJEL
Toluca, Mexico

Bigger Not Better

I have been buying *Model Airplane News* more often now because of two changes. First, there are more articles on getting back to basics. Second, there's Joe Wagner's column, "Small Steps."

I do not belong to a club and have no one to help me out. Therefore, I have to get all my information from books and magazines. Since a lot of books are quickly outdated, your magazine fills in the void, especially the articles on basic techniques.

Because I'm confined to small fields, I must use smaller airplanes—this is where Joe's column comes through. Most manufacturers lean toward bigger models, but Joe writes great articles for us small-field fliers.

RONALD LINDSAY
Bethel, CT

No one should turn up their nose at the fellow who (because of preference or need) flies small models. Bigger is not always better: it's simply bigger. All aspects of R/C have merit and should be treated with respect.

CC

Flying Time

I've been involved in R/C four years now and have bought every issue of *Model Airplane News* during that time. I've bought other magazines but yours is far and away superior. However, I remain disappointed by the lack of articles about the ultimate aspect of our hobby: Flying!

I belong to a small club and most of the time fly alone without the benefit of an instructor. I believe it would be beneficial to have a series of articles aimed at improving flying skills. I don't mean skills such as loops and rolls: I mean articles for sport fliers about advanced aerobatics.

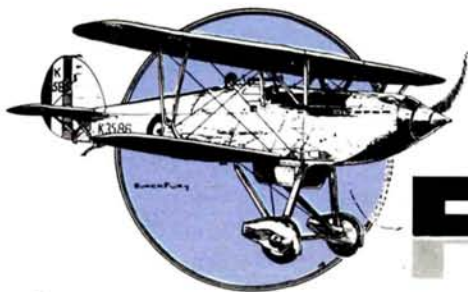
It also seems as if we're getting fewer kit reviews and more assembly articles on RTFs.

BURT BORK
Perry, OH

Burt, your point is well taken. We have done this in the past but maybe it's time to do it again with more depth. We're always open to creative criticism. As for the ARF issue, you should realize that there's a tremendous surge in new offerings in this category. As a result, we're being sent by the manufacturers 4 to 5 ARFs for every balsa kit. I'm quite sure this will level off, but a large segment of our readership wants to know about these new kits. We have to respond to their demands, however, we do run a construction article every month and at least one balsa kit review.

CC

We welcome your comments, opinions, and suggestions. Letters should be addressed to "Airwaves," *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897. Letters may be edited for clarity and length.



Fifty Years Ago...

by ART SCHROEDER



IN 1937, free-flight modeling was the only game in town—control line was not yet the giant it was to become and radio control was really a gleam in the eyes of a handful of pioneers. Model airplanes in 1937 were built, tested, adjusted, and finally tossed into the sky unfettered by any direct control—and always with a lot of praying that wind, thermals, and natural obstructions would not destroy hours and hours of work.

Fifty years ago, everyone flying miniature aircraft wondered about that mysterious thing called radio control. Would it indeed put an element of positive control into our otherwise “free thinking” creations. At the 1937 Nats, a couple of

modelers showed that control was possible. I doubt any realized that radio control would ultimately dominate the hobby/sport in little more than twenty years.

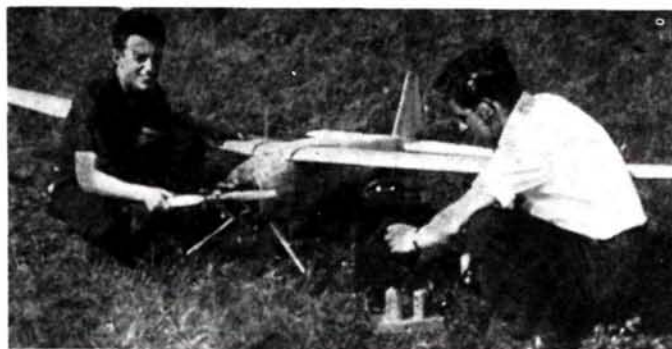
Interestingly, in the October 1937 issue of *Model Airplane News* Leo Weiss (a competitor at the 1937 R/C Nats) discussed possible radio-control methods. In this feature article, Weiss envisioned the system that would finally become the R/C norm for many years, the tuned reed. It is a fascinating article to read today since it was so close to what actually happened.

Today we are in an era of new modeling materials that includes plastics, carbon fibers, various woods, and metals. Modelers were in the same search during 1937 with experiments on a number of materials. Because of a looming war and growing shortages of materials, German modelers were extensively experimenting with replacements for balsa wood. These

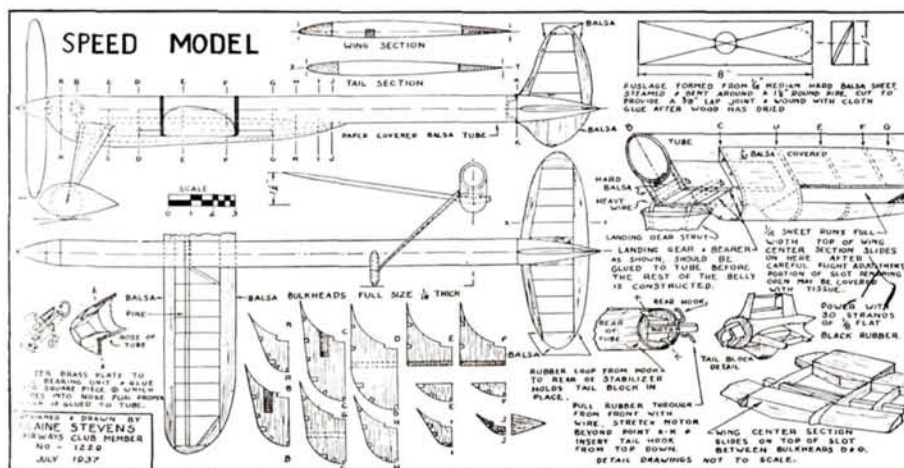


First trophy offered at a Nats for R/C flight by *Model Airplane News*.

included hardwood, pressed wood (labeled “Trolitax,” gelatin (if you can believe that), a form of paper mache, and



Leo Weiss and John Lopus prepare their 1937 R/C entry.



various metal alloys. The search was fast and furious and was described by Hans Meier in a feature article.

Speed was in the news in the form of a rubber-powered speed ship by Blaine Stevens. This design was the winner of *Model Airplane News*' design contest. There was no indication of how fast the airplane flew and judging was based on design characteristics, construction style, and clarity of plans. For his win, Stevens collected \$20, a pretty fair sum in those days. Compare that to *M.A.N.*'s first prize of \$2,000 for 1987's design contest, fifty years later!

Landing Gear



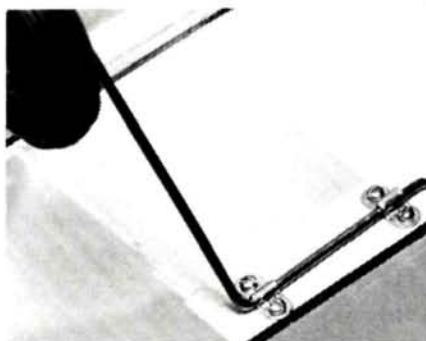
Basics of Radio Control

by RANDY RANDOLPH

THERE ARE almost as many kinds of landing gears and methods of installing them as there are kinds of airplanes. Retracts, which are popular with scale and pattern aircraft, have never become commonplace with sport fliers. For sport-flying, fixed gears predominate, and the two most popular types include those made from sheet aluminum and steel wire. Each has its own advantages.

Of these, probably the easiest to install are the various formed aluminum gears which are simply bolted to the bottom of the fuselage. Although they're made from tempered aluminum stock, which is quite hard, they usually require straightening after several hard landings. This is no real problem and it can be eliminated with steel wire cross bracing which adds little to the complexity. *(This type gear also lends itself well to float application—RU)* Landing gears made from steel wire are by far the most popular fixed gears. They are inexpensive, easily installed, and quite durable because of the springy nature of the wire. The nose gear of tricycle-gear airplanes is invariably of steel wire with a two- or three-turn spring near the mounting to provide for a "knee" type of action. These nose gears are almost indestructible and rarely require adjustment.

Wire main gears fall into two general categories: torsion and bolt-on types. The torsion gear is so named because its design places a twisting load on the wire under impact. Because the load is applied



Wing-mounted torsion bar landing gear. The torsion bar can be recessed into the wing for a smoother installation.

to a relatively large area of the wire, it is easily absorbed and the wire returns to its original position. Mountings for this type of gear are slightly more complicated than for simple bolt-on gears; however, they can be smaller and lighter because the gear absorbs the landing load rather than the mount. The gear legs themselves are simple to make, each leg requiring but three bends of 90° or less. Torsion gears can be mounted on the fuselage or in the wings, whatever the aircraft design calls for.

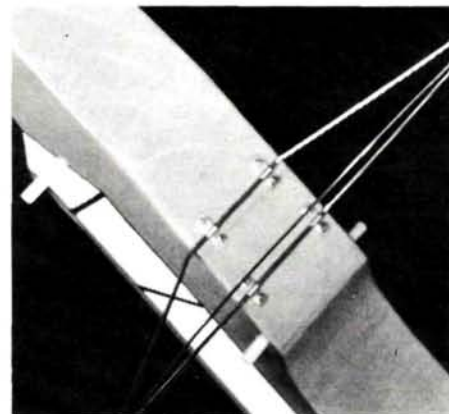
Bolt-on wire gears are almost always fuselage mounted for they require a fore and aft separation of mounting points. Even though the gear is formed from a single piece of wire it must be bent to provide this fore and aft separation of mounting. Twin-strut gears lend themselves to this type of mount very well. Both struts can be of smaller wire than would be necessary for a single leg, and

the spacing offers the ideal fore and aft separation for mounting. Fairings between the struts not only offer a scale-like appearance but reduce the drag of the open wire.

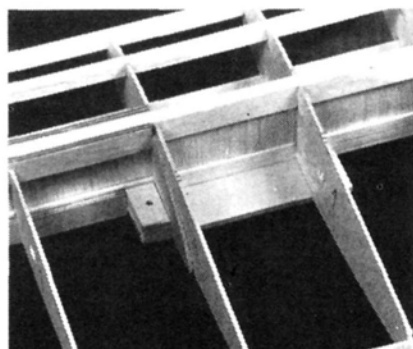
Formed aluminum gears offer bolt-on wheels. Some have threaded legs into which the axles (with wheels) are bolted. Others have holes drilled for axles which are then bolted in place with a screw and nut. Wheels should never ride on the threads of the mounting screws, but on smooth axles held in place by the screws.

New on the scene are the molded composite-gear assemblies available from Carl Goldberg* Models. These are molded in a silver-grey and our provided with stub axle already installed.

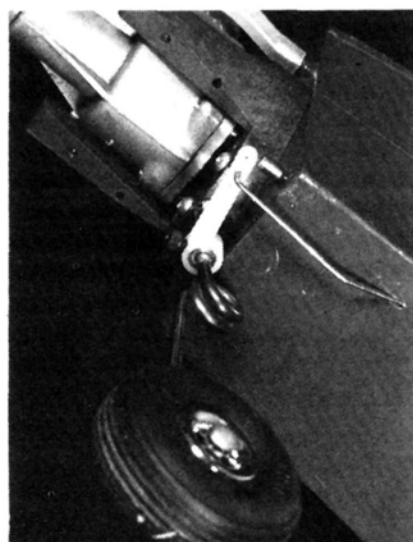
Wire gears offer two methods of wheel installation: collars or soldered washers. Wheel collars, which are available in all



Bolt-on wire gear is more complicated than torsion gear, but smaller wire can be used. Mount is a simple plywood plate.



Wing-mounted torsion bar landing gear mount shown from the inside. These mounts are simple yet take a lot of punishment.



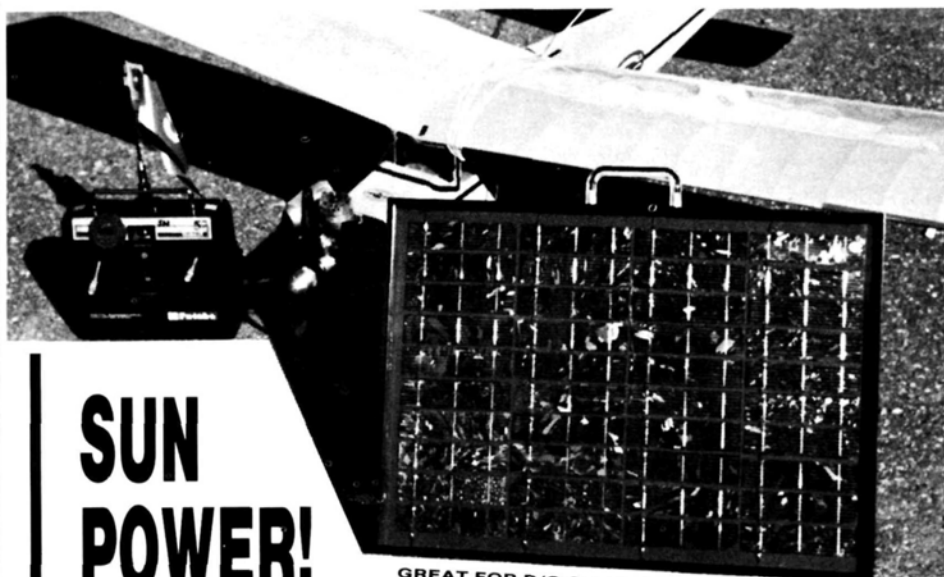
Almost without exception, nose gears are made with a two- or three-turn spring to give a "knee" action that absorbs landing shock.

popular sizes, offer the easiest installation because they require no additional tools to install. They should be placed on both sides of the wheel to keep it centered on the axle. Brass washers that fit the wire offer excellent wheel-mounting when soldered in place. Unless one is familiar with soldering techniques the wheel collar method is recommended.

A well-designed and installed gear can make good landings look great...and allow taxiing away from the bad ones!

**The following is the address of the company mentioned in this article:*

Carl Goldberg Models, 4734 West Chicago Ave., Chicago, IL 60651.



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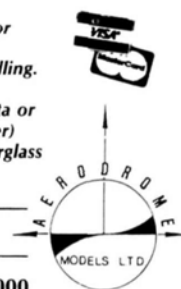
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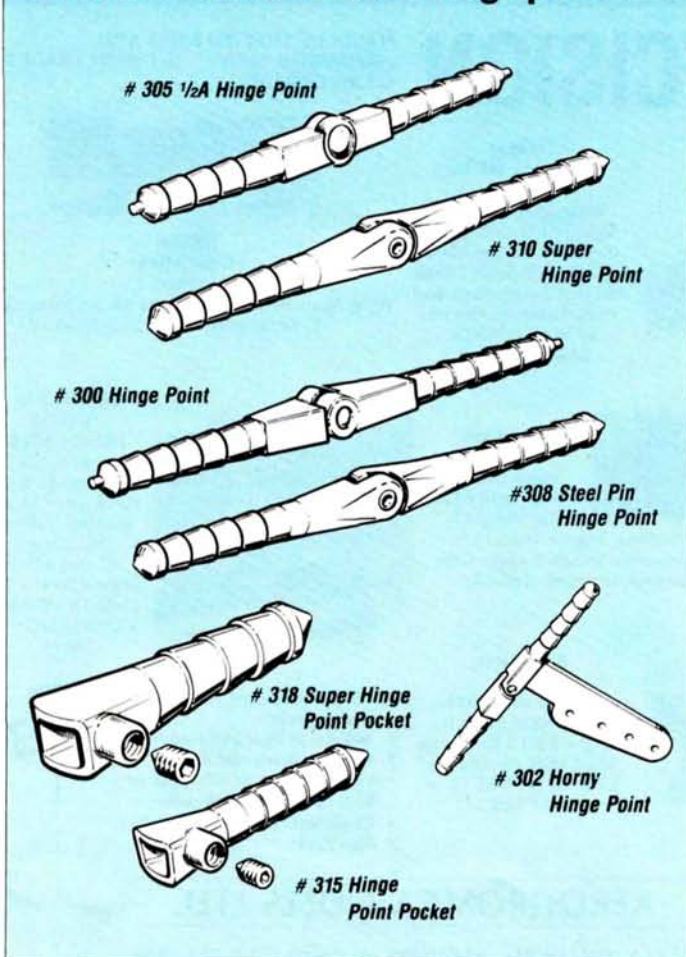
by the MODEL AIRPLANE NEWS STAFF

Hinge Points

Using Robart hinges simplifies tricky hinging geometry.

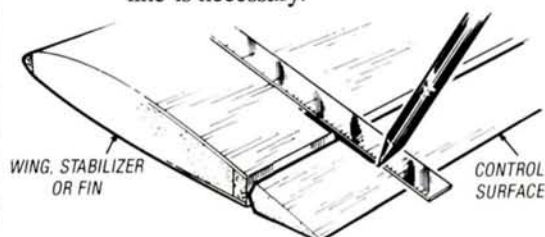
WE'RE ASKED oftentimes in correspondence, "Could you please tell me an efficient way to attach hinges?" This surprises us a bit, but it must be remembered that new modelers are plentiful. The fact is, there are hinge points for these applications and they are not only very good and time-proven pieces of hardware, but they are extremely versatile: they can be used on everything from Frise ailerons to slotted flaps. Moreover, with the aid of the drill jig, installation of these units is quick and accurate, so there's no reason to be intimidated in the least. Please note, there is a part number listed for the different Robart Hinge Points that are available.

Difficult hinging problems are simplified with the various Robart hinge points.

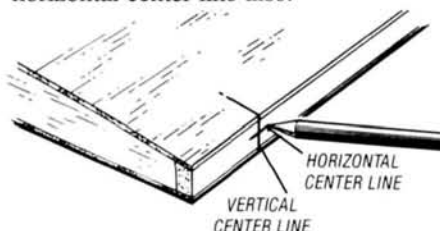


Place the control surface (aileron, elevator, or rudder) against the wing, stabilizer, or fin as appropriate. Draw lines across the rear part of the surface.

Note: For Hinge Points only a single center line is necessary.



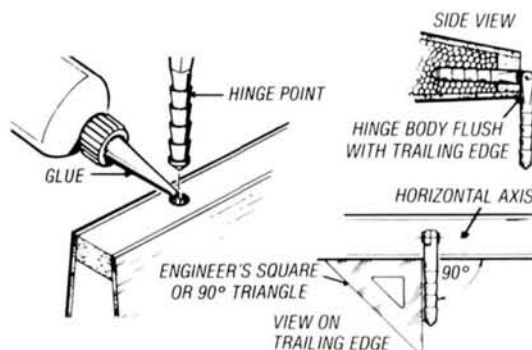
Extend the lines down the trailing edge spar as illustrated. If a Hinge Point Drill Jig is not available it will be necessary to draw a horizontal center line also.



Center the drill jig over the vertical line and drill the appropriate size hole to suit the hinge point:

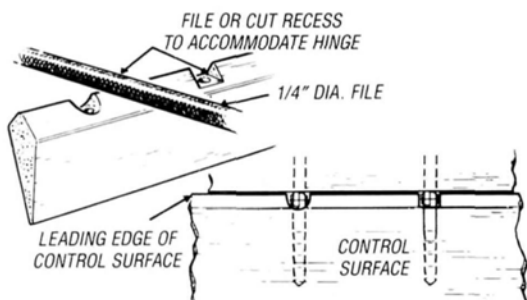


Inject glue into the hole or slot before inserting the Hinge Point. Take care to insert the Hinge Point correctly...the axis of the pivot must lie along the horizontal center line of the wing, etc. Refer to the illustration. Use epoxy or white (aliphatic resin) glue and be sure to wipe away excess glue after inserting the hinge.



Drill correct size hole in leading edge of control surface for Hinge Point using drill jig as in step 3. Using a file or knife, make a recess in the leading edge of control surface to accommodate hinge. Refer to illustration. Inject glue into holes, wipe off excess, and attach control surface to fix surface.

Note: If Hinge Point is too long, snip off barbed end to fit. Congratulations! You have installed the perfect hinge.

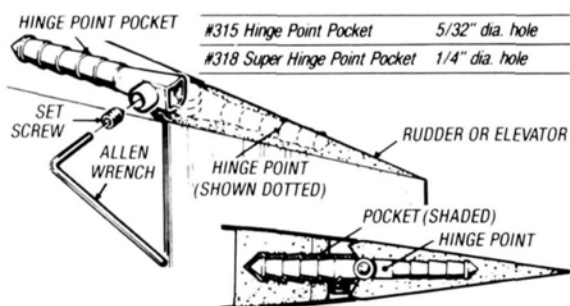


For removable control surfaces install Robart* Hinge Point Pockets:

Hinge Point Pockets may be installed in the wing or aileron only for instance, or in both the wing and aileron according to preference. The latter allows broken hinges to be removed completely without further damage to the model.

- Insert the Hinge Point into the pocket and tighten the setscrew with the Allen wrench provided.
- Mark and drill the surfaces as detailed earlier in steps 1 through 4.
- It is strongly advised that soap or modeling clay be squeezed into the recess on top of the setscrew to keep glue out of the threads.
- Inject glue into the drilled hole or slot, then insert the hinge and pocket assembly, wiping away excess glue.
- Allow the glue to set, then loosen the setscrew and remove the control surface, if required.

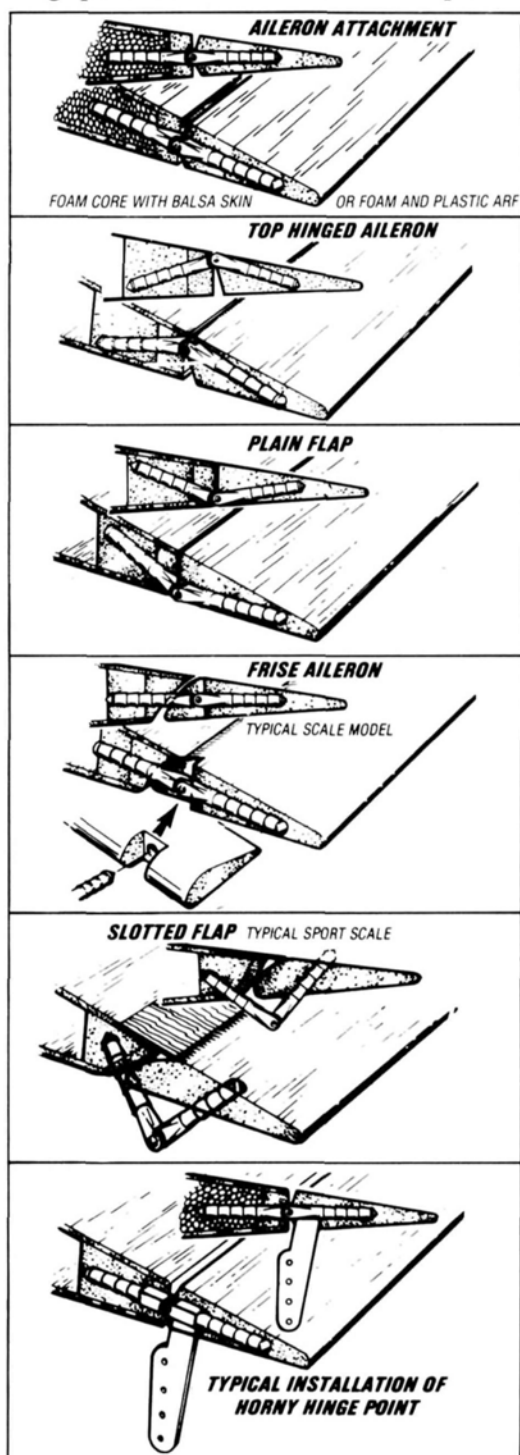
Note: It is permissible to shorten pockets where there is insufficient room to accommodate the full length. Cut off the pointed end, then plug the opening to prevent entry of glue.



For more information on Robart Hinge Points, contact Robart, P.O. Box 1247, St. Charles, IL 60174.

TYPICAL INSTALLATIONS

Hinge Points simplify the tricky hinging geometry of many scale-type installations. Installations where the Hinge Point is visible—such as the Slotted Flap or Junkers Flap—the Hinge points can be faired with balsa or plastic.



Open the door to
advanced aerobatics.

Nose-in Hovering

by PAUL TRADELIUS

AS WE PROGRESS in our ability to master the R/C helicopter, we go through several stages: learning to hover, transitioning to forward flight, and into some form of mild aerobatics. By this time we're proud of our accomplishments, and are really helicop-

ter pilots in that we have complete control of the chopper throughout the entire flight—except for the time when we make a mistake and the nose is facing us! When this first happens, it's amazing how quickly that comfortable feeling for the helicopter disappears. Once again, the helicopter seems to have a mind of its own, and the best that can happen is to add power and climb out of this precarious position. Looking at the nose of a

helicopter can be quite disorienting, especially for those of us who also fly fixed wings, since we're used to looking at the nose of the plane as it comes down final, and with the controls also reversed. And since there are so many times when you'll be faced with looking at the nose of

which way the nose is facing. The tail rotor control also continues to move the nose clockwise or counterclockwise. If you think of the nose moving clockwise or counterclockwise (vs right to left), this will help you get a quicker feel for the tail rotor while practicing.



Author with his Champion in a steady nose-in hover position.



The walk-around technique keeps the helicopter pointed into the wind, while you walk around to the side and then the nose.

ter pilots in that we have complete control of the chopper throughout the entire flight—except for the time when we make a mistake and the nose is facing us!

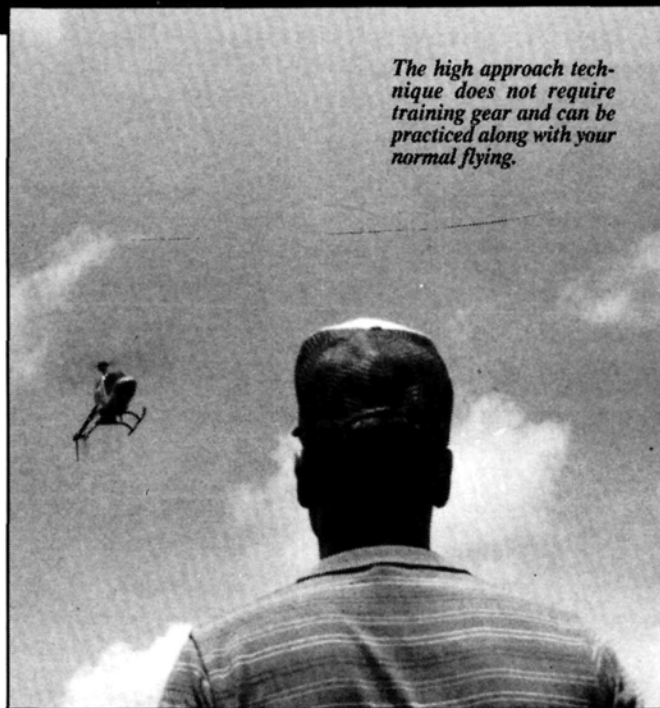
When this first happens, it's amazing how quickly that comfortable feeling for the helicopter disappears. Once again, the helicopter seems to have a mind of its own, and the best that can happen is to add power and climb out of this precarious position. Looking at the nose of a

your helicopter (such as trying different approaches, aerobatics, autorotations, etc.), I really believe that mastering the nose-in hover is a key to proceeding to more advanced maneuvers and a feeling of overall control of your chopper.

On a two-stick transmitter, the left stick is essentially the same in its control during either normal or nose-in hovering. The collective/power function makes the helicopter climb and descend no matter

One mistake I've seen people make is to drastically change their hover technique when practicing nose-in hovering. They start looking at (and flying) the tail rather than the nose. This may seem to make sense (at least initially), since now the tail (rather than the nose) follows the commands of the tail rotor control, i.e., right stick makes the tail go to the right. But the problem with this technique is that you have to completely switch your

The high approach technique does not require training gear and can be practiced along with your normal flying.



thinking, as well as where you're looking, whenever the nose is facing you.

In the heat of battle, you may not be able to make the switch quick enough. And what about the times when the helicopter is broadside to you? Or when you're facing the front quarter? Let me just say that I've never seen anyone use this technique successfully, although I'm sure someone is going to read this and be able to prove there is at least one person who can hover nose-in looking at the tail. However, the rest of us should still fly the nose no matter which way the helicopter is facing.

So with the left stick essentially the same for normal and nose-in hovering, let's take a look at the right stick. Unfortunately, the right stick is the problem stick. Everything is backward: right movement of the stick makes the helicopter bank left, an up command makes it back away.

I wish there was some easy gimmick I could give you to make this easier, but if there is one, I sure don't know what it is. My recommendation is that you go back to the good hover techniques you developed while learning to hover, and set up the helicopter specifically for hover again (vs flying circuits and aerobatics). Desensitize the cyclic controls so that the helicopter won't jump if you accidentally make the wrong command. If you haven't been using weighted blades, or a weighted flybar, these will also help in making the helicopter more stable. Also, take a look at your flybar paddles. Many paddles

which are standard equipment on most helicopters are a compromise between hover stability and aerobatic performance. Paddles which are heavy and which have a thick symmetrical airfoil will add greatly to the helicopter's stability. Depending on which of the three following techniques you decide to try, you may also need the training gear you thought you were rid of—so get 'em out of the attic and brush off the cobwebs.

From The Ground Up. The first technique for learning to hover nose-in brings you back to square one with your training gear. The goal is to not get the chopper too high while you try to learn the required "reverse" coordination. This is the least popular technique since it brings you back to the novice category—at least that's the way it looks to your friends when they see the training gear again. However, I prefer this technique and believe it will give you both the most useful practice time and the quickest results. One of the advantages of this technique is that you're close to the ground while practicing so you don't have far to fall. And with the wide training gear it'll be very hard to tip over the helicopter. Another advantage is that the helicopter will be fairly close to you—that means you'll be able to see even slight changes in attitude, which may require immediate correction. Finally, you'll be able to set the helicopter down and take a rest periodically—this nose-in practice can be a nerve-racking experience.

With a full tank of gas and a set of large

training gear strapped to your skids, stand in your normal hover position behind the helicopter and bring it into a hover to check all the trims. Then land and walk around to the front so you're looking squarely at the nose. Keep the wind to your back and stay about 15 feet or so in front of the helicopter. As you add power/collective, continue to watch the nose, but also take a look at the rotor disk using your peripheral vision. If the rotor disk is cocked to one side, the helicopter will follow in that direction when it can, so keep the rotor disk level. As the helicopter starts getting light on the skids, the training gear will give you an idea of what cyclic corrections to make by the amount of pressure on the various legs. Try to keep the pressure equal on each leg of the training gear and it will lift off in a level attitude.

Your normal hover is probably at an altitude of 4 or 5 feet, but don't try to hover nose-in at that altitude, since you're back again to the original learning process where the only thing that can hurt the helicopter is the ground—so keep it low. If you can get the feel of the controls with the helicopter 6 inches off the ground it'll have the same feel at a higher altitude—but being lower is much safer because the helicopter can't tip over!

Even after you're fairly proficient at nose-in hovering, the helicopter will still get away from you occasionally until you're really good and it becomes second nature. Be careful of early success as

(Continued on page 80)

The ever-popular Super Hots now joins the two-wing set.



SUPER Hots BIPE

by FLOYD MANLY

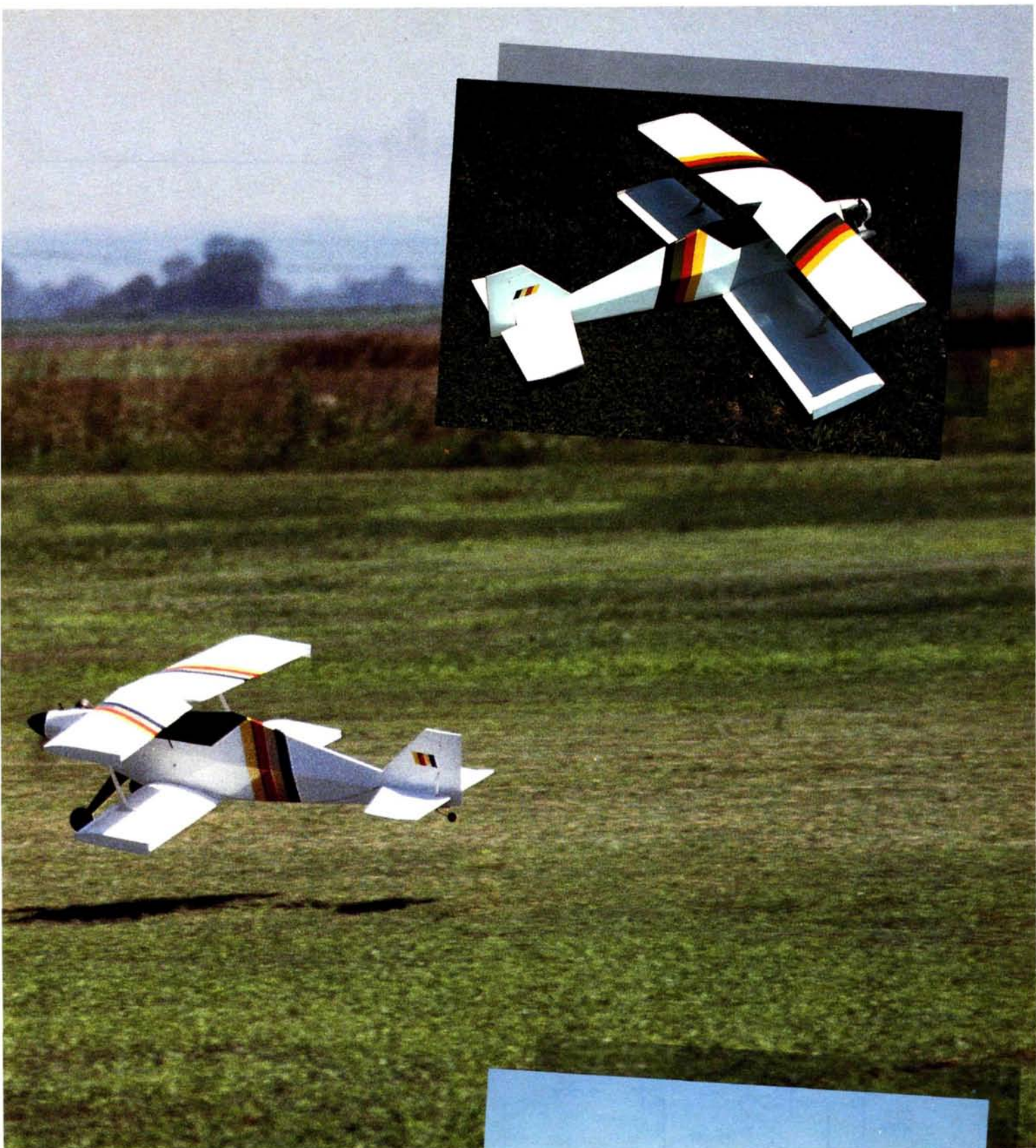
THE SUPER HOTS BIPE is almost an exact copy of the M.A.N. Super Hots with the exceptions of an added inch of depth to the fuselage and the cabane installation. We designed and built new wings to get the desired square inches, and we swept them both back simply because they look good that way. Their stagger was determined from a very old formula of Chuck Cunningham's that has worked on every biplane I've built.

The tip plates are an innovation copied from a full-size Super Pitts Special that is seen in our Arkansas skies very often. They work! Roll rate is increased noticeably, and slow speed stability is dramatically enhanced!

This is not a beginner's airplane nor a first-time scratch-

building project, so the usual step-by-step instructions and photos aren't included here. The plans should be true because they were dimensioned and drawn *after* the model was built and flown.

It flew so well, publisher Louis DeFrancisco, Jr., insisted that we get plans, pictures, and a story to him right away. The pictures are of the original conversion after 50 to 60 flights. The plans were done with as many notes as possible, and the



story is abbreviated because only experienced fliers will build a Super Hots Biplane, and they don't read instructions anyway (though they should).

CONSTRUCTION. The wire cabanes will take some grunting and cussing over, until you get the top wing incidence right. Don't give up on them until you have parallel wings with 1° to $1\frac{1}{2}^\circ$ negative incidence in the top wing. The interplane struts

(Continued on page 24)



Hints & Kinks

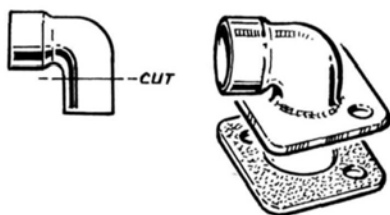
by JIM NEWMAN

Model Airplane News will give a free one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Hints & Kinks." Send rough sketch to Jim Newman, c/o Model Airplane News, 632 Danbury Rd., Wilton, CT 06897. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO, AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we cannot acknowledge each one, nor can we return unused material.



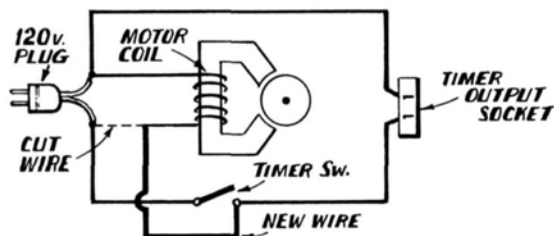
Some modelers use the technique of rubber cementing their templates to balsa wood. On peeling the templates, a rubber cement pick is useful for removing the residue from the balsa. Make a pick by painting rubber cement on a clean glass jar. Roll the dried cement into a ball, then use the ball or pick by dabbing vigorously on the balsa—this picks up the cement residue very easily.

Dennis Bryant, Burgess Hill, Sussex, England

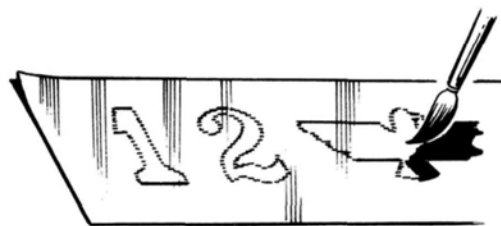


On many cowed gasoline engines it's difficult to reach in to choke the intake. Use a regular copper plumbing elbow, cut as required, then silver-solder to an adapter plate. Use a cork or similar gasket material for the gasket when bolting the elbow to the carburetor flange. A regular cork or surgical rubber bung is used for choking—in addition the elbow also serves as a neat ram air intake. A nylon stocking filter might be a good idea in dusty conditions.

Richard Rhoads, Brookville, Ohio

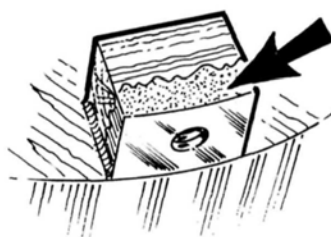


If one makes use of a household 24-hour outlet timer in charging Ni-Cd packs, it is not unusual to forget to unplug the charger after the charge cycle is complete, hence it switches on the charger again 8 to 10 hours after the last charge. Here is a simple modification to an inexpensive K-Mart timer. The modification disconnects the power from the outlet socket and the timer motor at the end of the charge cycle. *Don Kelton, Palm Beach Gardens, Florida*



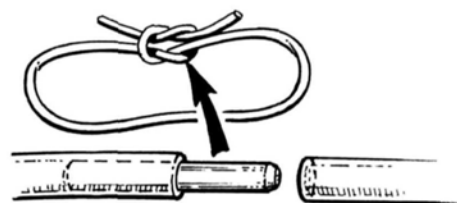
Many modelers now have microcomputers, which can be used to produce your own decals. Blank decal paper is available—try Sig or model railroad stores. Place a piece in the dot matrix printer to create your own design, which is then filled in with fuel-proof dope or enamel. The dot print can be carefully washed off with water if necessary.

Julie Knott and Dave Prochnow, Bellevue, Nebraska

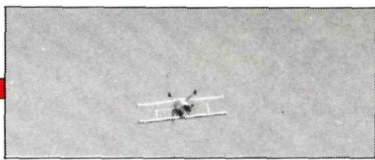


Many cowls are attached by wood or sheet metal screws into wood blocks. After a while the screws strip out of the wood blocks. This is a simple remedy, best put in place during building. Apply $\frac{1}{8}$ - to $\frac{3}{32}$ -inch Devcon Plastic Steel to each block. Because this is 80% steel filler, it's really hard and can be drilled and tapped for a machine screw, under the head of which a lock washer can be used.

Ray Gareau, Laval, Quebec, Canada



Do you have a large Old Timer that needs very large wing rubber bands? Make your own custom size bands from surgical rubber tube—the small-size, amber-color variety. Wet the ends, then tie a square or reef knot. Your columnist shows technique used to join glider high-starts. Cut a $2\frac{1}{2}$ -inch length of suitable size dowel, then apply cyanoacrylate into each end of surgical rubber tube. The joint is neat, invisible, and has never let go after hundreds of stretches. *R. Paul Voogd, Parkersburg, Iowa*

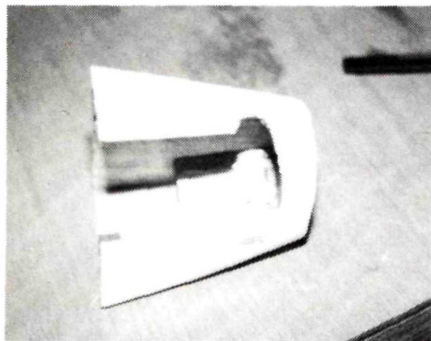


(Continued from page 21)

should be made after the wings are fitted to the fuselage and should be approximately $\frac{1}{8}$ inch longer than the space between the wings to assure a tight fit.

The fuselage can be built in a couple of evenings. Be careful not to attach the chin plate and landing gear block until after fitting the bottom wing and drilling for the dowel in the leading edge.

The bottom wing builds in the following manner. Cut the 18 ribs needed from semi-hard $\frac{1}{16}$ -inch balsa sheet. Sand them all to the same shape, then mark their tops. Notch all but four of the ribs to be cut later for the ailerons. Build each wing panel separately, including the leading edge and trailing edge sheeting and cap strips, and shear webbing. Use a razor saw to separate the ailerons from the wings, then add $\frac{3}{16} \times \frac{3}{4}$ -inch balsa stringers to the back of the wing and front of the ailerons. Join the wing halves with $\frac{3}{4}$ -inch dihedral under each tip, before sheeting the top center section. Cut out the servo bay and center ribs to install the plywood floor and dihedral braces. Fiberglass the center section before trial-fitting the wing to the fuselage. Carve and sand



Cowl can be built of balsa blocks but a fiberglass cowl and wheelpantz are available.

the fuselage to get a good fit and the zero incidence in relation to the fuselage reference line. Assure that the wing is centered and squared before drilling a $\frac{1}{4}$ -inch hole through the dowel mounting plate into the wing leading edge. Carefully epoxy the dowel into the wing leading edge, then recheck the wing for zero skew before drilling the holes for the rear mounting bolts.

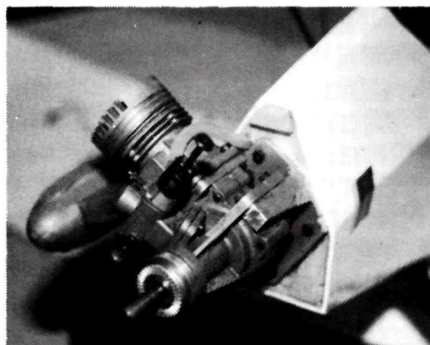
Complete the bottom wing by finishing the little details of tip plates, control rods, hinges, etc.

The top wing is much easier and quicker to build because there are no controls or dihedral to contend with. First,

build the halves separately, then join at the center ribs with NO dihedral. After all the sheeting and cap strips are installed, mark and cut the openings for the cabane mounting plates on the bottom side of the wing. Check for skew and the negative incidence before epoxying the plates to the wing. (That step is probably the most important of all.) A Robart Incidence Meter is essential. Without the negative incidence in the top wing, the aircraft will have a tendency to swoop, or climb, whenever speed increases as in diving approaches and throttle changes.

The rest of the building can be got directly from the plans.

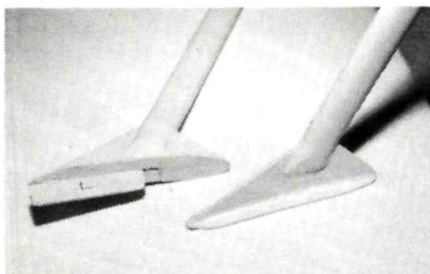
FLYING. Let me start with a question:



Original airplane was powered by a Fox Eagle, which proved to be more than enough power.

can anyone tell me why I need to hold a little down-elevator when doing a knife-edge with my bipes? Other than that fault, the Hots Super Bipe flies so well that the test hop portion of its first flight lasted about 1 minute until the trims were set, then we just flat wrung it out and landed only when it ran out of fuel. It was thumbs up from everyone that has seen her fly. She tracks well through all maneuvers and is very stable during slow flight, especially on landing approaches.

The Fox Eagle II .60 is too much engine for her, but I like the power to take off on prop alone and climb vertically to any altitude.



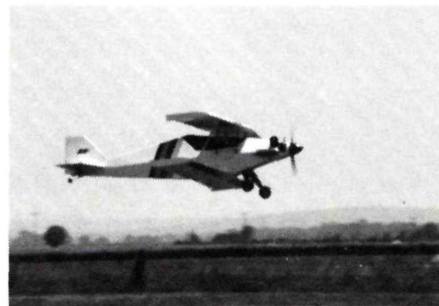
Wing struts are simple plug-in types, but must be slightly oversize to remain in position.

Order the Full-Size Plan!

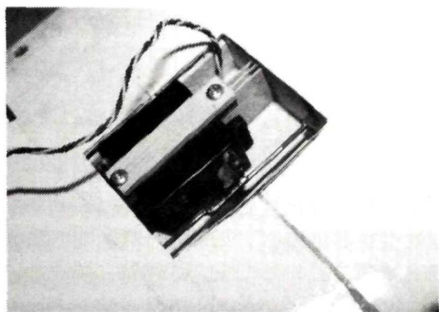


#10871 **SUPER HOTS BIPE** \$16.50

A two-wing version of the fun-fly plane of the '80 and '90s. The Super Hots Bipe features simple construction, fantastic slow flight qualities, and aerobatic capabilities suited for a flying circus. Model weighs 5 to 6 pounds, and has a 47-inch span and 846 square inches of area. For a .50 to .60 engine and a 4-channel radio.



It all comes together in the air. Airplane should be a fun-fly winner.



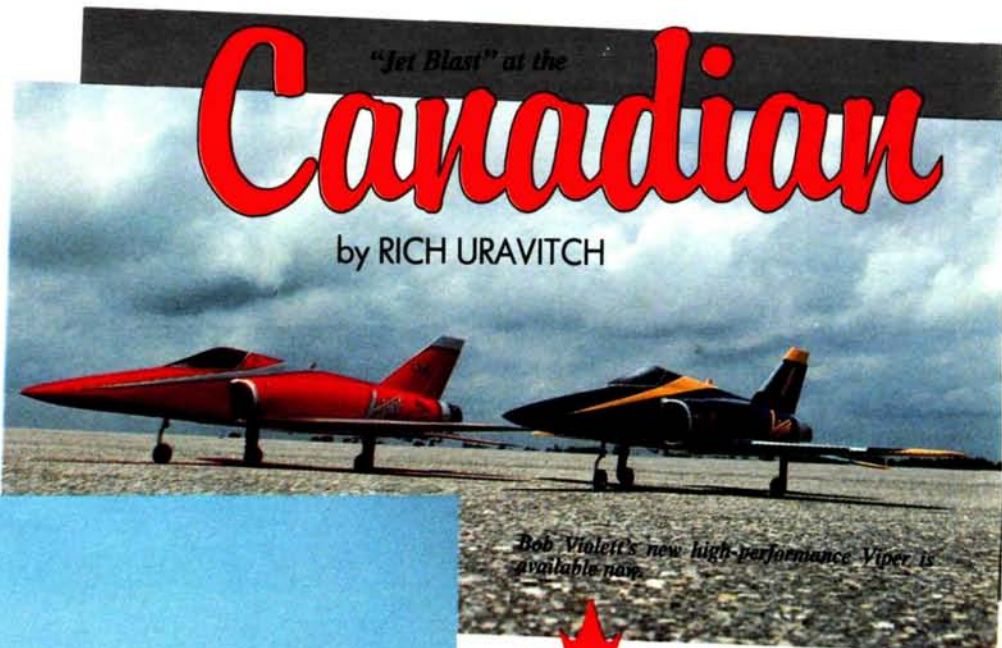
Aileron servo cavity shows an interesting hold-down method.

The HSB is faster than most bipes and still as quick as any. I'll guarantee you that your first snap-roll will be more than one and a half! To get just one, you have to punch the sticks, and release them before she starts to roll or she'll keep going for more than you intend.

With the overwhelming success that the single-wing Hot has enjoyed in sports circles, this two-winged version will certainly bring home more than its share of fun-fly trophies!



Dr. Jack Tse's gorgeous SR-71 on recon mission.



Bob Violett's new high-performance Viper is available now.



I HEADED North to Canada again this year to partake in the festivities conducted by the Bay of Quinte Aeromodelers in the form of their '87 edition of the Fan Jet Rally. This is the second time around for this affair and, as expected, it's growing.

The weather for the weekend started out overcast but cleared by Saturday. Anyone who thinks it's

cool in Canada in June sure was proven wrong this year. Felt a lot like the Fan-Fly in Texas!

The relaxed, laid-back atmosphere of these "fly-ins" is really terrific. As I mentioned before, there's no real pressure on any of the fliers: no "pin time" limits, no schedules, just some great flying, lots of shop talk and information exchange. If it was happening in fans, it was there! Meandering through the pits, one could see some of the most exciting



Sterner Engineering's F-80 with Dynamax fan on final approach.



An awesome aircraft is Dr. Jack Tse's F-14 with full-swing wing capability.

Fan Fly



Top: Bob Fiorenze's F/A-18 Hornet with twin Dynamaxes. Left: Dr. Jack Tse readies his SR-71.



Amazing Dr. Tse's Air Force. He seems to be commander of the world's sixth largest Air Force.

jets anywhere. Lots of nicely done kits, some scratch-built projects under way, even a ducted-fan amphibian!

Forty-eight fliers registered and most of them flew the better than 75 airplanes on hand. Among some of the unique things I noticed was a really cute Canadair Challenge type "biz jet" awaiting fan installation. It



Byron F-16 in Belgian Tiger markings.

appeared to be sized for RK-20 units. Chris Wilson brought his Sturner F-80 powered by a Dynamax unit rather than the usual Byro-Jet. This conversion will be available from Sturner. He worked out a simple inlet system and did away with the cheater hole. He had some



Dennis Crook's Starfire B from Jet Model Products breaks ground.



Bob Fiorenze makes sustained 45-degree knife-edge with his F/A-18 Hornet.



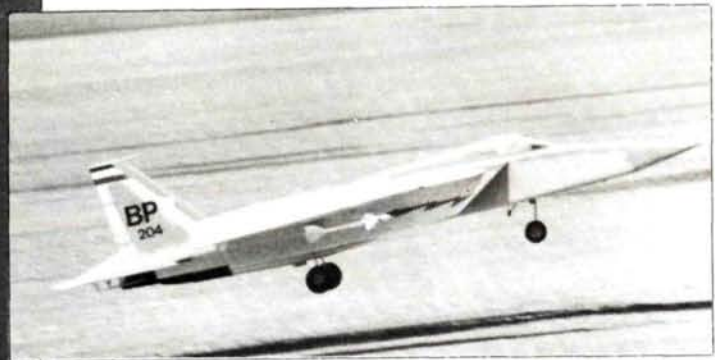
Patti Violet on final with one of her dad's gorgeous Aggressors.



Frankie Rega's modified F-86 powered by a Boss fan.



Tom Cook's Starfire B in Thunderbird markings.



Bob Parkinson's Byro-Jet-powered Regal Eagle is a simple balsa-foam machine, but a very fine performer.

nose-gear steering problems early on, but once resolved, the Crimson machine flew with authority. Bob Fiorenze dazzled everyone with his new F/A-18 Hornet. He flies it even more smoothly than his crowd-pleasing Playboy F-4J Phantom. A pair of Byron F-16s modified by Gilles Pelletier and Martin Lefebvre really looked great. One was done as the one-off AFTI vehicle and had operating speed-brakes. The other was a "stocker" but featured a unique Belgian AF paint job as applied to their entry level into the European "Tiger Meet." The black-and-yellow-striped motif precluded any visibility problem!

One of the fun aspects for guys like me who cover these events is the friendships established and sometimes maintained throughout the year. Like Butch Rosser, for example. Butch is from Akron, Ohio, and is an avid fan enthusiast. I met him three years ago at the Southwest Fan-Fly. He admonished me for not having enough color in my coverage. Well, Butch, this one's for you! He provided nonstop Sunday narration describing maneuvers as they were flown, egging on some of the participants to the point of near runway/belly contact and generally added lots of sparkle to the activities. He'll do well in this hobby. I can just feel it!

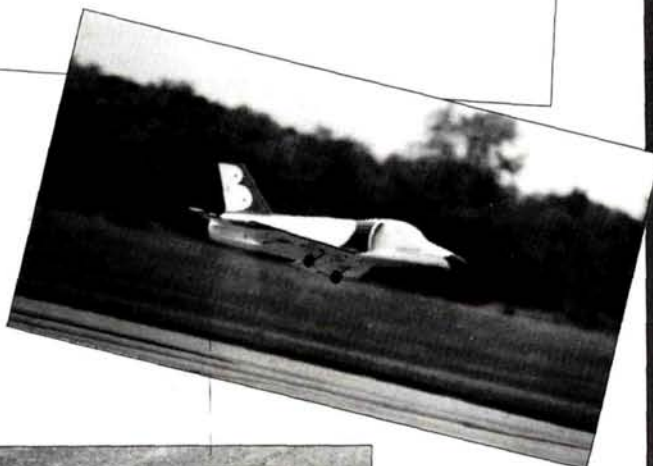
(Continued on page 105)



Butch Rosser shows up at every meet, a most enthusiastic modeler and narrator.



Top: Bob Parkinson's Regal Eagle simple fan jet in flight.



Byron's super-fast Bullet on takeoff.



Sport scale Canadair Challenge Biz-jet. Fan not yet installed.



Above: Avro CF-105 Mk.II Arrow by Bob Parkinson. Left: Dynamax fan installation on an F-80.



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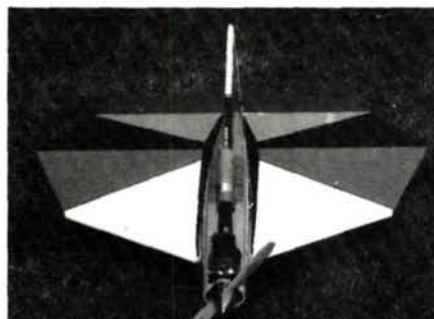
We at Air Age would like to take this opportunity to thank all of you for making this contest such an overwhelming success. The collective creative effort which passed our desks from across the country and the world is an encouraging indication that the modeling spirit is truly alive!

When we first announced our Great Design Contest in the May '87 issue of *Model Airplane News*, we had no idea just what we were in for—over 400 entries! Hundreds more than we had ever dreamed of. Unfortunately, in view of the obvious space constraints, we had to narrow this unwieldy payload of entries down to fifty finalists. We honestly would have loved to show you each and every design we received.

Now, the rest is up to you. Simply fill in the adjoining ballot with the name and corresponding I.D. number of your top five choices. All voters will be eligible for a drawing on a Kyosho Planet 40 pattern ship from Great Planes, a Fox 40BB Deluxe ABC, and a two-year subscription to *Model Airplane News*.



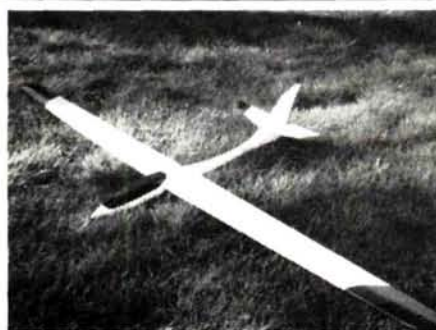
1. Cessna 208—3-channel, sport scale, 52" span, .10-.15 2-cycle; Tim Sarber, Wyoming, MI.



2. Experimental "Octa"—Sport model, 40" span, .60 2-cycle; Milan Zdrubecky, Milwaukee, WI.



3. "Bass Ackwards"—Forward-swept sport model, T.D. 049; Mark Clifton, Port Orchard, WA.



4. Scimitar—High-performance sailplane, 100" span, opt. 2-meter; Mark Triebes, Saratoga, CA.



5. Push-Pull 40—Sport twin, 66" span, .40 2-cycle (2); Al Masters, Rocky River, OH.



6. Messerschmitt M35b—Sport scale, 56" span, .40 4-stroke; Harry Stewart, Nevada City, CA.



7. Classic Coupe—Sport/trainer, 46" span, .049-.09/electric; Mario Borgatti, So. Dennis, MA.



8. Chuck's Q.T.—Schoolyard sport, 36" span, .09 2-cycle; Charles J. Anaston, Dallas, TX.



9. Poplar Goose—Flying boat, 72" span, .40-.45 2-cycle; William Thompson, Fremont, CA.



10. 1915 Hansa Brandenburg—Sport scale amphibian (no details provided); Ken Behring, Mesa, AZ.



11. Computer Parasol—4-channel, sport, 48" span, .20 4-stroke; Pete Welborn, Castro Valley, CA.



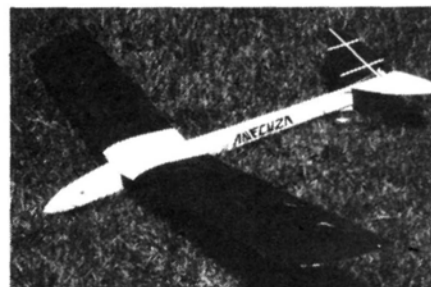
12. Monocoupe—Sport scale, 55" span, .25-.40 2-cycle; Lori Sumwalt, Oklahoma City, OK.



13. STOL Sport—Sport pattern, 72" span, .40 2-cycle; David J. Brazee, APO, NY.



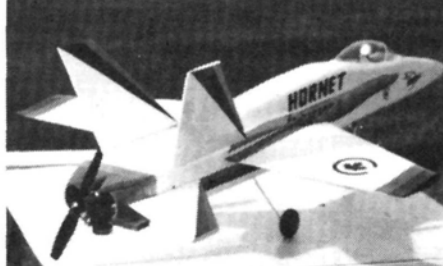
14. Cessna L-19A Bird Dog—Fun-scale, 3-channel, 72" span, .40 4-stroke; Ben Hansen; Towson, MD.



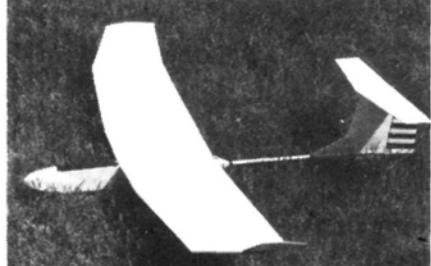
15. "Anecuzo" Glider—2-channel, hand-launched, 54" span; Stan Jonutis, Glendive, MT.



16. D.H. Vampire—Sport scale, 1/2A power; Brad Woods, Glendale, AZ.



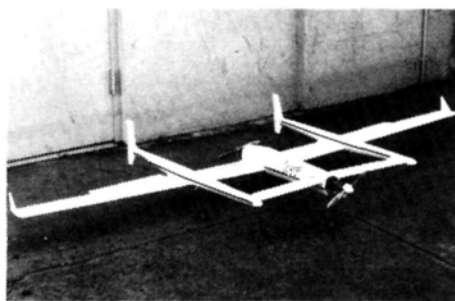
17. F/A-18 Hornet—3-channel sport, 32" span, .25 2-cycle; Richard James, British Columbia, Can.



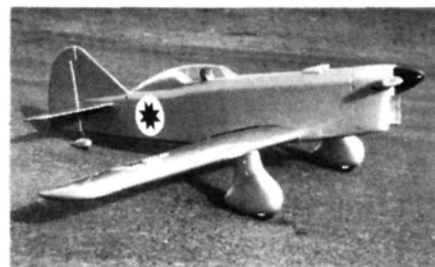
18. "HI" Glider—2-channel, hand-launched, 60" span, power pod opt.; Christer Broman, Louisville, KY.



19. Pusher Fighter—4-channel, sport, 48" span, .60 2-cycle; Alan Riddle, Fielding, New Zealand.



20. Voyager—Sport scale, 88" span, .25-.30 (2); Calonico/Junker, New Orleans, LA.



21. Latvian VEF I-16—Sport scale, 58" span, .45 2-cycle; Gunars Bumburs, Babylon, NY.



22. Davis DA-2A—Sport scale, 57" span, .60 2-cycle; Grant Saverberg, N.E. Calgary Alta., Can.



23. Brewster F2A-1 Buffalo—Sport scale, 2-4-channel, 45½" span, .15-.20 2-cycle; Richard Batt, Parowan, UT.



24. WACO SRE—Scale, 70½" span, .90 2-cycle; Douglas Hobbs, Lumberton, NC.



25. PATO I Canard—Forward-swept slope soarer, 58" span; Alex Fischman, Neshar-Haifa, Israel.



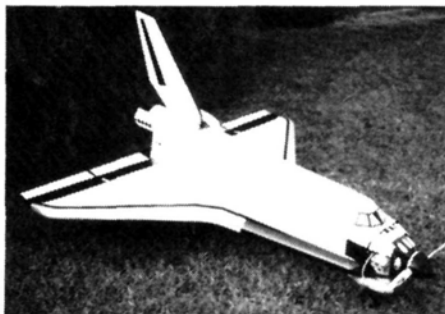
26. Piper J-3 Cub—Sport scale (1/8), 52½" span, .20 4-stroke; John Marek, Webster, TX.



27. Junkers J-9—WW I sport scale, 52" span, .40 4-stroke; James Howe, Parma, OH.



28. Hawker Hurricane—WW II fun scale, 45" span, .20-.25 2-cycle; Charles Radford, Ft. Leavenworth, KS.



29. Space Shuttle—Sport, 3-channel, 45½" span, .61 2-cycle; Michael Tyler, Glendale, AZ.



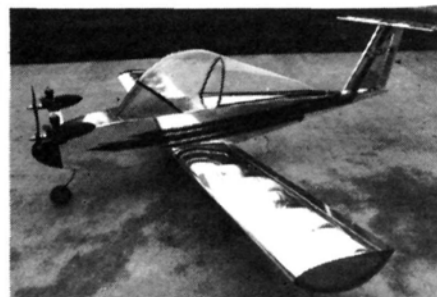
30. CF-101 Voodoo—Sport scale, ducted-fan, 53" span, .72/Viojett; Ian Ward, Alta., Can.



31. SB2U-1 Vindicator—Sport scale ($\frac{1}{6}$), 84" span, S.T. 3000; "Doc" Keith, Madera, CA.



32. Boeing 247D—Schoolyard scale twin, 55½" span, .10-.15 (2); Russell Farris, Charlotte, NC.



33. Cri-Cri (Cricket)—Sport scale ($\frac{1}{4}$), 50" span, ½A (2); Charles Campbell, San Angelo, TX.



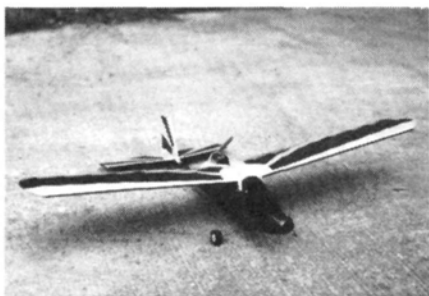
34. Bellanca Airbus—Sport scale, seaplane, 80" span, .40-.45 2-cycle; Stan Rutz, Muskegon, MI.



35. F.C. Floater—Sport trainer, 78" span, .40 4-stroke; Ed Kudirka, Ontario, Can.



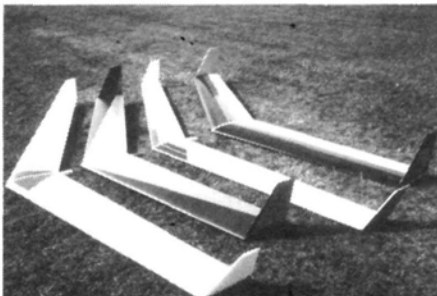
36. Bipe III—Sport aerobatic, 84" span, 1.2 4-stroke; Carl Risteen, New Brunswick, Can.



37. Cyclone I—Sport electric, 36" span, pusher; Fred Niemi, Raleigh, NC.



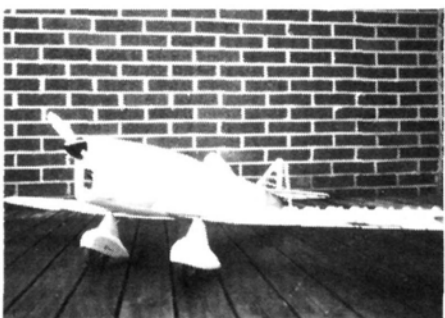
38. Douglas DC-3—Sport scale, 75½" span, .20 4-stroke (2); David Ramsey, Milltown, NJ.



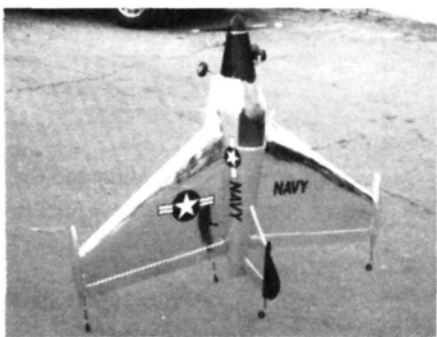
39. Flying Rainbow—Flying wing glider, 3200 mm span, 2800 grams; Walter Panknin, Zeisigpfad, W. Germany.



40. The Bee—Sport, novelty, 78" span, .60 2-cycle; Raymond Slifko, Morrisville, PA.



41. Sparmann "Hunter"—Sport scale ($\frac{1}{6}$), 66" span, .40-.45 4-stroke; Bengt Norman, Ostergatan, Sweden.



42. Convair XFY-1 Pogo—Sport scale, 60" span, 1.2 4-stroke; Mike Boland, Mesa, AZ.



43. Funny Gull—Twin-electric-powered glider, pusher, Mabuchi 380 (2); Th. Gordijn, Geldrop, Holland.



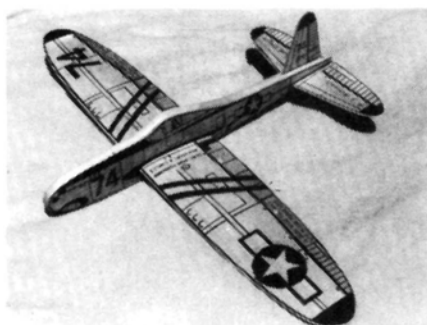
44. Seagull—Sport amphibian, 59½" span, .40 2-cycle; Graham Tucker, Toronto, Can.



45. Aeronca 7AC Champ—Sport scale (1/6), 3-channel, .20-.30 2-cycle; Richard J. Foch, Bowie, MD.



46. Saitoschmidt—Sport scale, 52" span, .40 4-stroke; Wayne Case, Olympia, WA.



47. Model 74 Fighter Replica—Aerobatic slope soarer, 72" span, 3.5 lbs.; Raymond B. Smith, Cardiff, CA.



48. Monett Monex—Sport scale (1/3), 1670 mm span, .45-.60 4-stroke; Bertil Klintbom, Vidunge, Sweden.

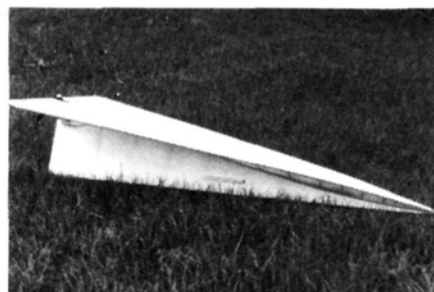
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Fill in the name and corresponding number of your top five choices.

	Name	ID#
1st	_____	_____
2nd	_____	_____
3rd	_____	_____
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Mail your ballot to:

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632 Danbury Rd., Wilton, CT 06897



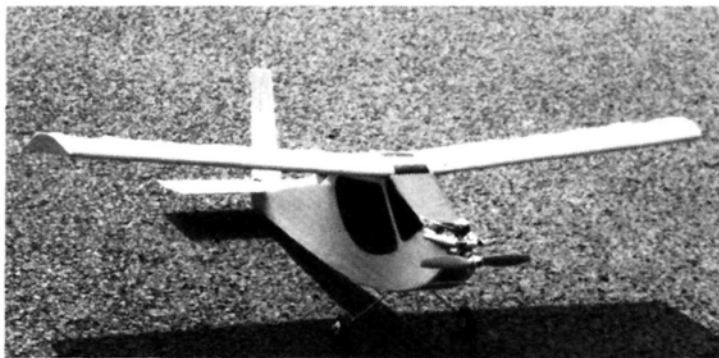
49. "Paper Airplane"—2-channel sport, .049-.051; Mark McCray, San Diego, CA.



50. Fer-De-Lance—Sport pusher, 48" span, .61 2-cycle; Stephen Bayless, Knoxville, TN.

Small Steps

by RANDY RANDOLPH



Brian Allen's Buttercup may help him start .02-.03 racing in his area—if he has anything to do with it.

lot of good flying fields have been lost for this reason.

Modifying airplanes to make them more personal is one of the beauties of this sport and helps to make it so great. You can't change the shape of a baseball or bat, but you can sure personalize your airplane. The picture I have of Bill Stodgell's plane is a fitting example.

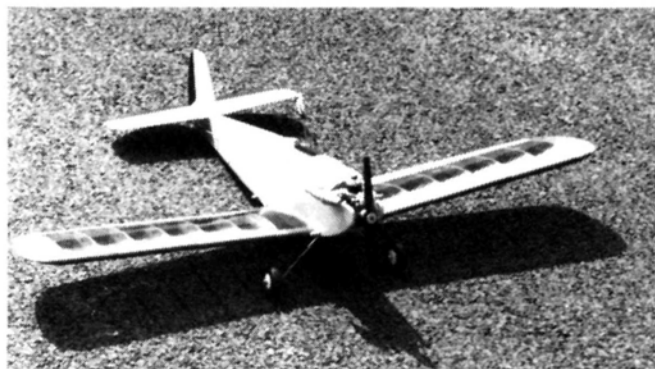
Bill hails from Jefferson City, Missouri, and calls his plane Himer. Bill describes it as being scratch-built from RCM plans of

IT'S A SHAME, but I haven't had any experience with Cannon engines. All of the really small engines that I've built (and loved) were powered by Cox engines, so I have to rely on other folks for the word on .03s and .06s, for instance, Brian Allen of Sterling, Virginia.

Brian sent in pictures of two birds (Cannon .03- and .06-powered, respectively) which offer wide performance envelopes, brought about by changing the nitro content of the fuel. Brian writes:

"Picture No. 1. The high-wing job, Buttercup (or Bumblebee, as we call it) has a 27-inch span, weighs 12½ ounces, and is powered by a Cannon .03. The

Zinger designed by Herb Clukey is a very frisky performer with .06 power.



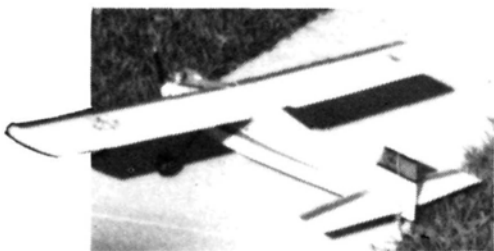
I believe it was published in the February '80 issue of *Model Aviation*. Picture No. 2. A design by Herb Clukey, called the Zinger, I think it was in *Flying Models* May '80 issue. It has about a 30-inch span and weighs 21 ounces with a Cannon .061 and four-channel radio. On 25% fuel it goes very fast and is very aerobatic, but the wing wasn't designed for such a powerful engine (the original had a reed valve Cox .049). If the airspeed gets too high or the Gs go up, the wing flexes and the plane goes crazy. As a result, it only has about five flights on it to date. I'll probably rebuild the wing sometime this winter."

One of the things that Brian mentioned in his letter was removing the muffler from his engine to help boost power. Sometimes this works and the increase in noise on these small engines isn't that great. But the pitch of the sound changes and that can be annoying to your field neighbors. Unless you're far away from other people, don't fly without mufflers; a

the Homer. He changed it from a low-wing trike-geared job to a high-wing tail-dragger. Bill writes:

"It retains the pattern-type performance of Homer on a Super Tigre .23, while adding the versatility of hand-launching from any old weed patch. Some folks can hand-launch low-wingers, but not me! It's yellow and red with black trim and sky blue windows and I use an

(Continued on page 115)



Bill Stodgell has produced a string of Himers. They fly so well that you can't build just one!

radio is a three-channel Tower mini with rudder, elevator, and motor control. With the muffler and 25% fuel it goes putt-putting around. But when I removed the muffler and gave it a blast of 55% fuel it went like stink! It does the neatest loops, spins, and rolls in a very small box. It's a real crowd pleaser and when I crank her up everyone stops to watch. A couple of others with .02s and .03s have shown up recently. The design is by Fred Reese and

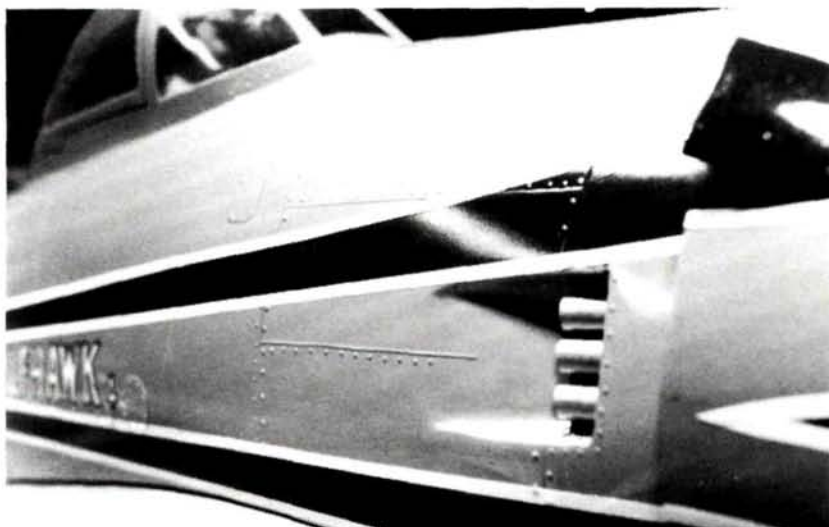


John Gill solved the problem of removable biplane wings with wheel collars.

Rivets and Panel Lines

Sporty Scale

by RICH URAVITCH



Top Flite Bearcat shows realistic panel and rivet detailing. Technique for this procedure is outlined in the text. Detailing such as this enhances any scale aircraft.

IT'S TECHNIQUE time again, folks, and this time I'll show you how to do raised access panels, skin joint (panel) lines, and riveting. All of those neat raised surface details becoming more prevalent in Sport Scale are easy to duplicate; all that's required is actually doing it. It's almost like weathering, but not as bad. There seems to be a natural reluctance to try something new on a model you've lovingly labored over using methods with which you're familiar. Fear not, like a lot of other things, you can be shown once and each attempt becomes better, is accomplished faster, and appears more convincing.

The required material includes .020 wide matte drafting tape, a sharp No. 11 X-Acto blade and knife, a sheet of chrome trim MonoKote, a soft pencil, an 18-inch steel rule, a hypodermic syringe, and white glue (Wilhold/Elmers). Optional items are a plastic kit or line drawings of the airplane you're modeling.

The starting point for this lesson is to have all of the finish preparation work done on your model. This means all filling, filleting, doping, priming, and sanding. Use your favorite technique (you might as well be comfortable during at

least a portion of all this!) and give the primed airframe a final wipedown to remove all sanding dust.

Now, referring to your plastic kit or line drawings, draw all the lines and panels you want directly on the primed surface. Use a soft pencil and press lightly, just enough to have a line to follow. The quantity of surface detail can be as much or as little as you wish.

Pretty easy so far, huh? Okay, now apply the panel tape over all the lines that

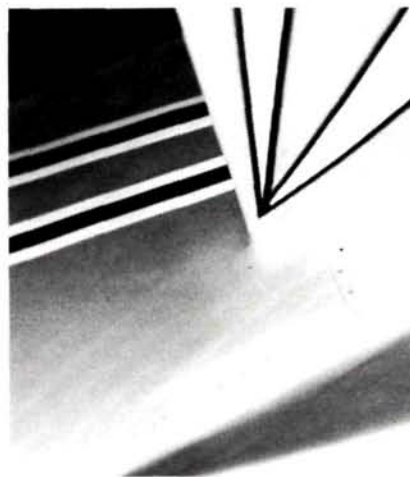


A hypodermic is used with white glue to simulate scale rivets.

Techniques

represent skin joints and press firmly in place. Avoid too much stretching of the tape when applying, as it tends to reduce its adhesive qualities. Access panels and doors should be cut to size from the chrome Trim MonoKote and applied directly to the primed model. Again, press firmly into place, eliminating any trapped air.

Now comes the part you've all been waiting for—rivets! Fill your hypodermic syringe with white glue and practice on a piece of cardboard or similar material with lines drawn on it. Apply slight pressure to the plunger to discharge glue from the nozzle. Touch the surface lightly and deposit the drop of glue. It should flatten out a bit and look like a rivet head. If it doesn't, your glue is too thick and should be thinned a bit with water. Start again, this time doing ten or so consecutive "rivets" along a line. With continued practice you'll develop a rhythm and be able to move along very quickly. If you blow it, simply wipe the bad ones off with



Fuselage tail surface fairing with simulated rivets and Dzus fasteners.

sufficient time to dry (I usually wait 24 hours), wipe down lightly, and proceed with your paint application.

Apply the paint in thin coats to preserve the detail. You can either leave the panel tape in place after color coating or remove it. If you primed with gray primer, as I do, removal of the tape will leave a .020 line which simulates flush skin joints quite well. Both methods are visually effective and are purely a matter of personal preference. Either way, two light coats of clear material (epoxy, lacquer, or polyurethane) should be applied over everything to final-seal the surface.

Stand back, admire your work, and be ready for all the oooohs and aaaaahs when you unveil your beauty at the next meet—and remember, it's okay to exaggerate a little on the time it took!

Rich Uravitch, c/o Model Airplane News, 632 Danbury Rd., Wilton, CT 06897. ■



Materials illustrated are necessary to affect a top-notch rivet detail.

a moist paper towel, allow the surface to dry, and proceed. Examine your practice piece and, if you're satisfied, go to the model and do it again in exactly the same manner.

Depending on just how much surface detail you're adding, the whole airplane shouldn't take more than two evenings or about four hours. Allow all the glue dots

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How To:

by RANDY RANDOLPH

MAKE FILM HINGES

The hinging system described is a simple and inexpensive way to secure a strong, tight hinge line for elevator, rudder or ailerons. It will work with any of the popular films: Black Baron, Monokote or Ultrafilm. In the photos, the film was simulated to clearly demonstrate a technique that has caused some confusion in the past.

1. Slice two strips of film $\frac{1}{4}$ to $\frac{1}{2}$ inch wide. Lay one strip, with the glue side up, on a piece of film backing. Place the second piece over the edge of the first, and glue side down with a $\frac{1}{16}$ -inch overlap. Iron the two sides together at the overlap.

2. Using a straightedge, slice the joined strips into 1-inch-wide segments. Each segment will be one half of a hinge. Therefore, if eight hinges are needed, 16 segments would be required.

3. Iron a strip of film over the edges of the surfaces to be joined. The film should overlap both faces by $\frac{1}{4}$ inch.

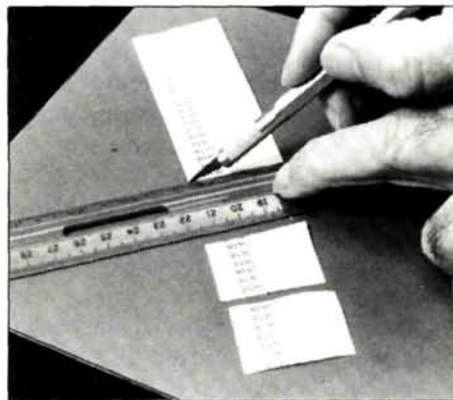
4. To form a hinge, iron the glue side of one hinge segment on the top of the surface and next to it, on the bottom, iron another in the same way. Be sure that the finished hinges are at right angles to the hinge line.

5. Join the other surface at the hinge line by holding it tight against the first and ironing the glue sides of the hinges to its top and bottom. When all hinges are installed, the surfaces can be covered.

6. The finished hinge line is tight and the hinges are almost invisible. The film used for the hinges should match the trim on the airplane.



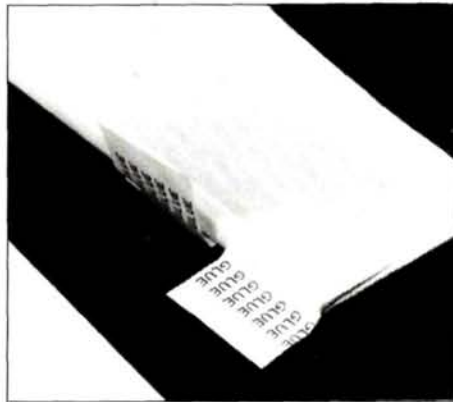
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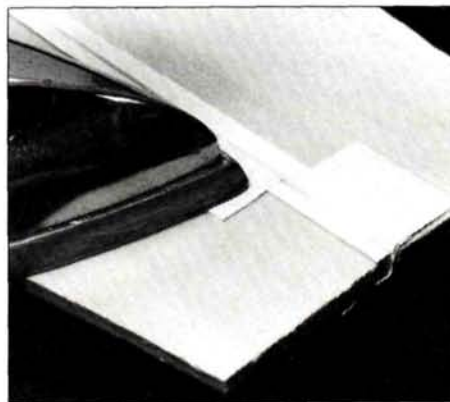
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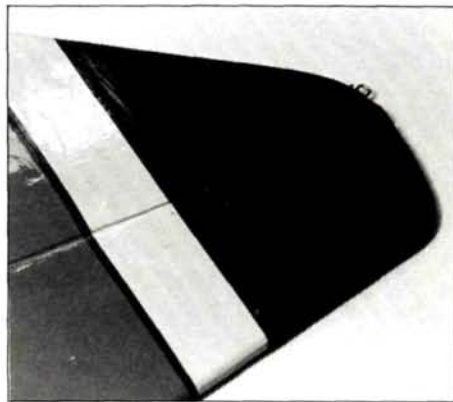
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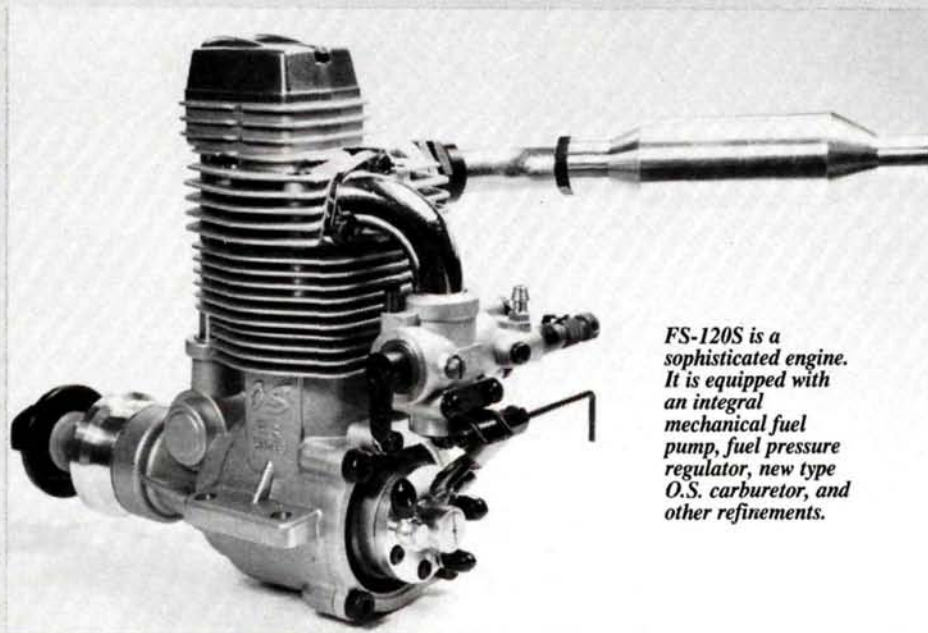
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Engine Review Round-Up



O.S. FS-120S "SURPASS"

by PETER CHINN



FS-120S is a sophisticated engine. It is equipped with an integral mechanical fuel pump, fuel pressure regulator, new type O.S. carburetor, and other refinements.

SPECIFICATIONS

Type: Air-cooled, single-cylinder, four-stroke-cycle, with pushrod operated overhead valves and built-in fuel pump.

Bore: 30.4 mm (1.197 in.)

Stroke: 27.5 mm (1.083 in.)

Displacement: 19.96cc (1.218 cu in.)

Nominal Compression Ratio: 8.5:1

Speed Control: O.S. Type C-12 adjustable automatic mixture control carburetor.

Checked Weights: 944 grams (33.3 oz) including header pipe and muffler.

Mounting Dimensions:

Crankcase width: 46 mm

Length (from prop driver face): 135 mm

Height above CL: 114 mm

Bolt-hole spacing: 58x25 mm

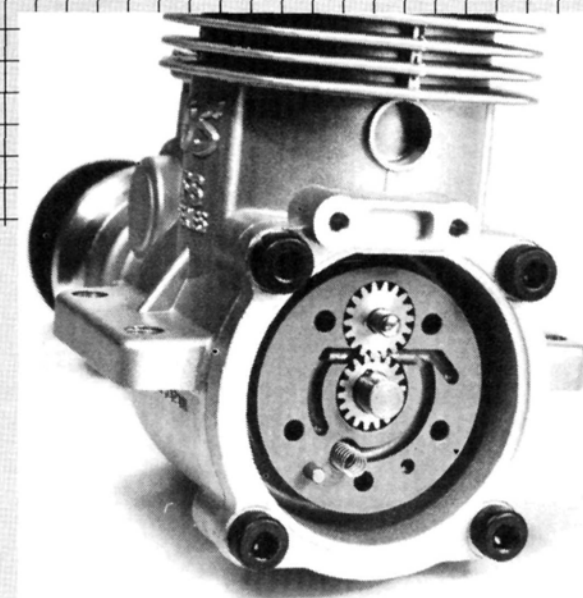
Manufacturer's Claimed Power Output: 2.1 bhp at 12,000 rpm

Manufacturer: O.S. Engine Mfg. Co. Ltd., Higashisumiyoshi-ku, Osaka 546, Japan.

U.S. Distributor: Great Planes Model Distributors Company, P.O. Box 4021, Champaign, IL 61820.

THIS NEW 20cc (1.2 cu in.) class four-stroke-cycle motor is a very significant advance on the original O.S. FS-120; so much so that one is tempted to call it an entirely new engine. To do so, however, would put this reporter on the spot, since he has written, elsewhere, that most of the better engines on the market are not entirely new models, but developments of previous ones.... You could say that the FS-120 "Surpass" (or FS-120S for short) is the exception to the rule. Or, alternatively, that there are no bounds to development and that an engine can be redesigned so extensively that it no longer has much in common with its predecessor.

The latter is certainly true with the FS-120S and this situation is largely due to the way in which expectations have



Back end partially dismantled to reveal gear type fuel pump (driven by crankpin), and the diaphragm type fuel regulator (right) which maintains correct fuel flow to carburetor irrespective of aircraft attitude or tank location.



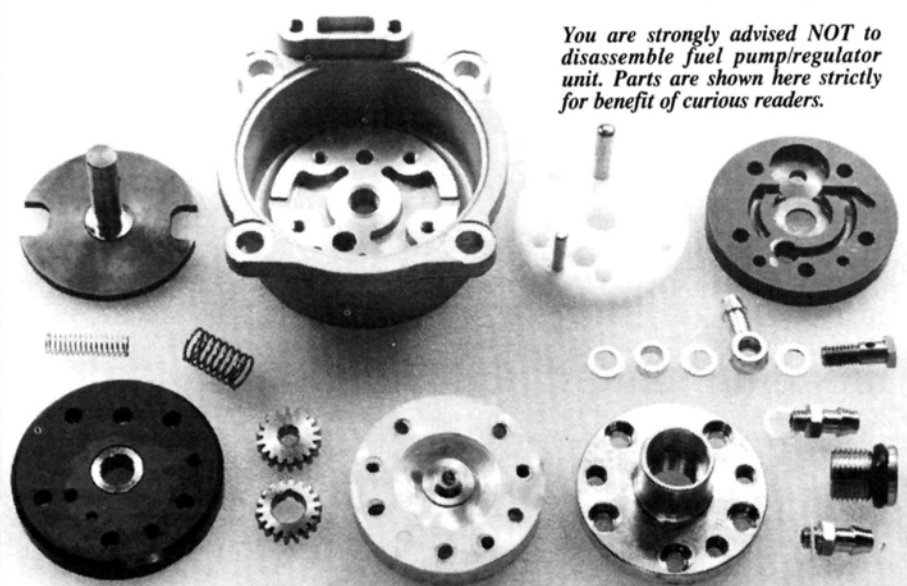
limit was set at 20cc, as had been sanctioned, a year earlier, for FAI Pattern Aerobatics. Some manufacturers had at this time already tooled up for 15cc engines and, since those new engines were destined to compete alongside existing high power/weight ratio 10cc (.61 cu in.) two-strokes, it was thought that the new four-strokes would need to be kept within reasonable external dimensions

it appeared was a totally different engine that very successfully perpetuated the rear camshaft layout of the original O.S. FS-60.)

As first marketed in 1983, less muffler, the FS-120, at 27.2 oz, was not only the lightest 20cc engine, it was also lighter than other makes of 15cc four-stroke. At the same time, it was quite powerful (on test, ours checked out at 1.76 bhp at 11,000 rpm on 10 percent nitro fuel) which resulted in a very favorable power/weight ratio. This was good, so far as pattern aircraft were concerned, but within a year or two, it became evident that there was not going to be a wholesale switch from two-strokes to four-strokes in pattern flying, just yet. The four-stroke was, however, making a big impact in scale models where engine size and weight were less critical. The future success of 20cc four-strokes, therefore, would probably be in their ability to deliver higher torque in order to turn the more efficient large diameter props required for scale aircraft.

It was clear that, in order to stand up to the stresses imposed by increases in performance, as well as to incorporate certain other features, the FS-120 would need to be extensively redesigned. The FS-120S is just such a redesign. All its major components, including its body casting, are new. In fact, the only parts that it inherits from the original FS-120 are the cylinder liner, piston-ring, push-rods, cam followers and ball bearings. It is 17 percent heavier than the old model.

The basic layout of the FS-120S follows that of the FS-120 insofar as it is a

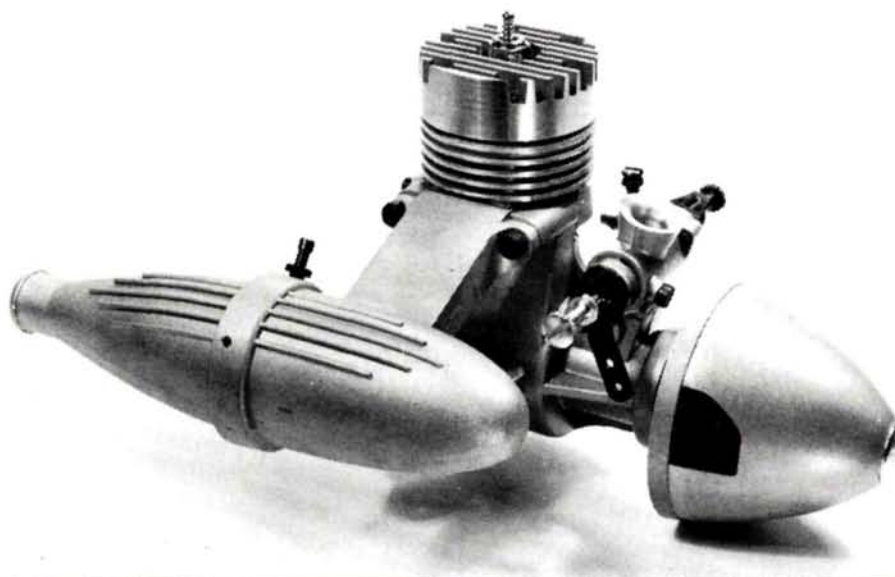


You are strongly advised NOT to disassemble fuel pump/regulator unit. Parts are shown here strictly for benefit of curious readers.

grown in regard to engines of this type. The original FS-120 was introduced early in 1983, following a late decision by the *Federation Aeronautique Internationale* to amend the then-recently-agreed 15cc four-stroke engine maximum displacement for the FAI World Championship Scale class. The revised

and weight limits. Accordingly, Enya's response was to introduce a bored and stroked 120-4C version of their then-new 15cc 90-4C. O.S., in the meanwhile, cancelled production of their planned 15cc model, opened it up to 20cc and released it as the FS-120 instead. (The production 15cc engine, the FS-90, when

Engine Review Round-Up



FOX 40BBRC "SERIES 6"

by PETER CHINN

SPECIFICATIONS

Type: Air-cooled, single-cylinder, side exhaust, two-stroke-cycle with crankshaft rotary-valve and Schnuerle scavenging.

Bore: 0.840 in. (21.34 mm)

Stroke: 0.715 in. (18.16 mm)

Displacement: 0.3962 cu in. (6.493cc)

Nominal Compression Ratio (full stroke): 10:1

Speed Control: Fox Series 6 adjustable automatic mixture control carburetor.

Checked Weights: 317 grams (11.2 oz) less muffler; 363 grams (12.8 oz) with Fox muffler.

Mounting Dimensions:

Crankcase width: 33 mm

Length (from prop driver face): 72 mm

Height above CL (less glowplug): 65.5 mm

Bolt-hole spacing: 1.5x0.625 in.

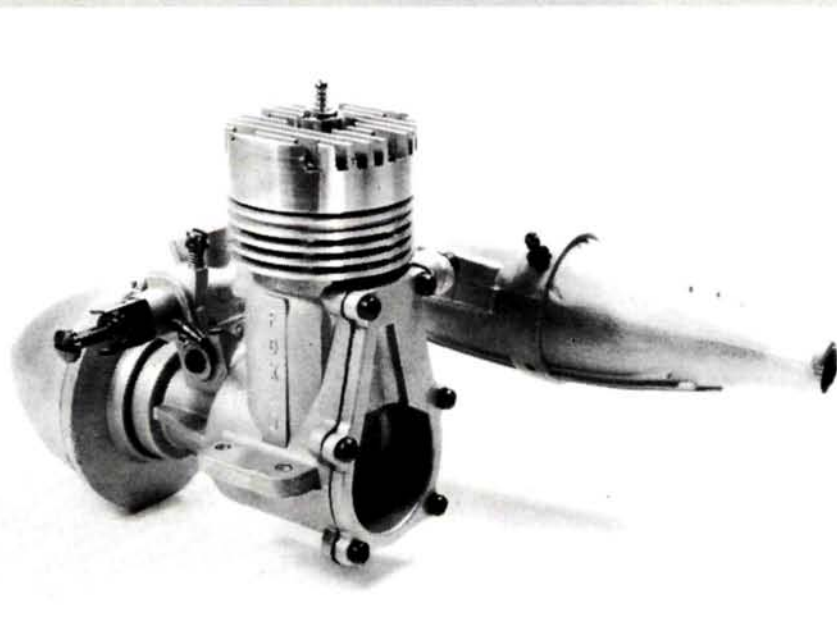
Manufacturer's Claimed Power Output: Not stated.

Manufacturer: Fox Manufacturing Company, 5306 Towson Avenue, Fort Smith, AR 72901.

MOST OF THE better engines on the market are not entirely new models. A new design is rarely so faultless that it cannot be improved upon, so it is usual for a good engine to be a "development" of a previous model. Not surprisingly, the Fox "Series 6" engines are developments of the "Series 5" models dealt with in the January 1984 "Engine Review Round-Up" feature and, as we commented at that time, the Series 5 was, itself, built around a modified version of the earlier Fox Combat-Special Mk. III body casting.

The Series 6 engines currently consist of .36 cu in. and .40 cu in. models in both radio-control (throttle equipped) and standard control-line (non-throttle) versions. The version dealt with here is the 40 radio-control engine, known as the 40BBRC model.

The most significant differences between this engine and its Series 5 predecessor is that it has two ball bear-



One of several unorthodox Fox design points is the engine's tall six-screw backplate. Muffler can be replaced by "tilt-up" type if preferred.



"Series 6" has switched to ABC piston/liner construction. Note unorthodox method of retaining wristpin with small roll pin through piston.

ings, instead of one, and an ABC type piston/cylinder-liner assembly, instead of the long familiar Fox combination of a Meehanite cast-iron piston running in a leaded-steel cylinder sleeve. Actual component parts that are common to both old and new models are limited to the crankshaft, rear ball bearing, carburetor, and crankcase backplate.

The main casting has the addition of a housing to the crankcase nose to accommodate the extra ball bearing. Since the crankshaft is unchanged, the front bearing is of the same i.d. as the rear bearing ($\frac{1}{2}$ inch) but has a smaller o.d. ($\frac{7}{8}$ in.). The body casting has Fox's unique high "back door" which, when removed, uncovers the lower part of the cylinder liner as well as the crank chamber.

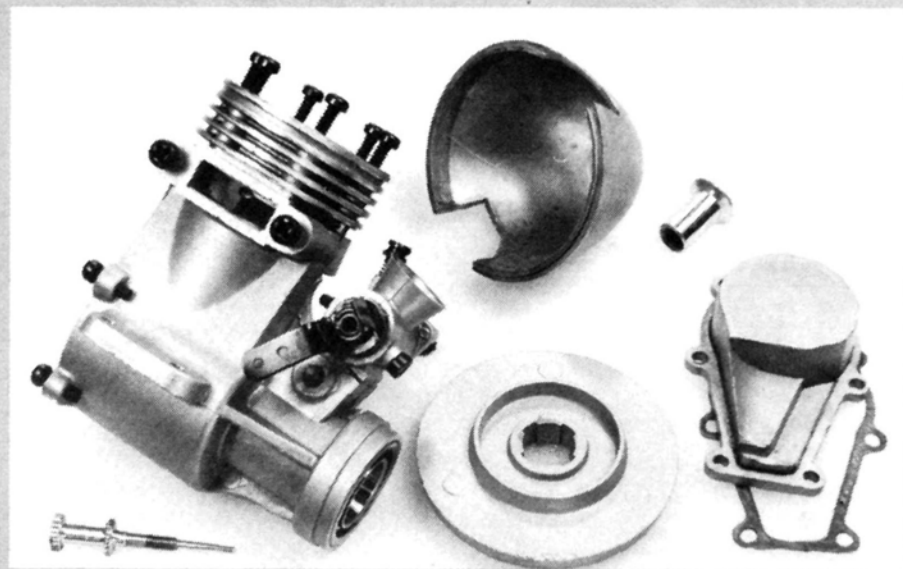
At the front end, the Series 6 engine is equipped with a pressure cast aluminum spinner assembly, an unusual refinement for an R/C engine. In place of the standard type Fox prop driver, there is a robust 2-inch diameter spinner backplate (with serrated driving face for the prop) which is keyed to the usual Fox short splines on the crankshaft. This has a channel into which the edge of the spinner shell fits, in the approved manner, to eliminate any tendency for the shell to expand away from the backplate under high centrifugal loadings. The prop is secured, in the customary Fox manner, by a steel serrated face washer and a $\frac{1}{4}$ -28 UNF nut.

Apart from the aesthetic attraction of its parabolic profile, the spinner offers

two advantages: it provides a positive concentric driving surface for the rubber cup of an electric starter and its 45 gram weight is an aid to smooth running by virtue of the fact that its inertia, like that of a flywheel, helps to smooth out cyclic torque fluctuations. However, if the

from the rest—is maintained. For example, whereas, with other ABC engines, it is necessary to buy a new cylinder sleeve if the piston requires replacement, Fox makes it possible to fit a new piston to an existing undamaged sleeve by offering replacement pistons in four sizes, stepped three ten-thousandths of an inch apart, i.e., .0003 in. undersize, nominal, .0003 in. oversize and .0006 in. oversize.

Also, quite unique, is the method of locating the wristpin in the piston. In place of snap-ring retainers or soft end-pads, a small roll-pin passes diametrically through one end of the tubular wristpin and into adjoining holes drilled from the outside through the piston boss. The machined connecting-rod has a bronze bush at the crankpin end and oil holes at both ends. The complete piston and conrod assembly is very light, weighing



Revised "Series 6" body casting has addition of front ball bearing housing. Also shown are spinner assembly and crankcase rear cover.

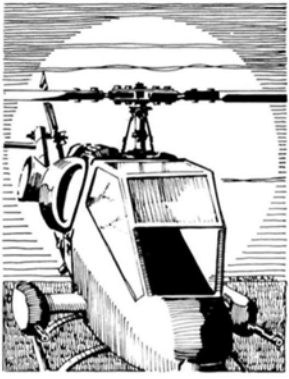
owner does not wish to use the spinner assembly, a standard Fox drive washer is available to replace the spinner backplate.

In using an ABC piston/cylinder assembly, the Series 6 breaks with Fox traditions. At the same time, another Fox tradition—always to be a bit different

only 12.2 grams, compared with 17 grams for the Series 5 engine with its cast-iron piston. The benefit of this reduction in reciprocating mass should be evident in lower vibration levels.

The Schnuerle-plus-third-port scavenging system follows the pattern of the Series 5. The unbridged exhaust port is

(Continued on page 90)



Helicopter Chal

by CRAIG HATH

BEFORE ATTEMPTING to fly a helicopter for the first time, or before any flight, it's a good idea to go over a pre-flight checklist. This is a common practice among full-scale pilots and should become part of your routine.

The very first item on your list should be batteries. The rechargeable batteries that are part of your radio system must be completely charged. This means that the batteries should be charged throughout the night before *each* flying session. Do not assume that the batteries will be fully charged just because you charged them two weeks ago and haven't used your radio system. Ni-Cd batteries will lose their charge even during storage. There are some inexpensive voltage meters available for the purpose of checking your batteries. These meters put a load on the battery pack and show the amount of voltage left in the cells. Ni-Cd batteries drop in voltage as the charge is used. By tracking your particular battery pack, you can become familiar with its normal loss of charge rate and can detect the available flying time that remains. I'll go into more detail about the care and use of batteries in a future issue.

The next item is to be sure that your helicopter is fully assembled for flight. Some fliers disconnect the universal ball links to the rotor head for transportation purposes, or remove the main rotor blades completely. If you follow this practice, make it a habit to confirm the connection of all ball links and check all the blade retaining screws to be sure they're tight. Once the machine has been assembled, give it a last-minute check. Be sure that all the radio connections are tight, check for any worn or damaged control linkages, and give your chopper a general inspection for its airworthiness.

Perhaps some of you feel this is overkill, but the more attention you pay to the general condition of your helicopter, the more likely that you'll have fewer mechanical problems. This becomes very important when you're trying to concen-



Dick Meeker's test stand allows running-up of the entire helicopter power system.

trate on learning how to fly. It's very frustrating to have interruptions caused by mechanical failure during your flight practice. The helicopter takes a lot of punishment during the learning process, so every available advantage will help out.

Now that the helicopter is ready to go for its initial flight, perform the radio system check. To check the radio range, place the helicopter on the ground and turn on the radio system. Collapse the transmitter antenna completely and walk away from the model while moving a control that's visible from a distance (I use the collective pitch). Walk away from the helicopter until you reach a distance of at least 50 feet. I prefer to walk away until the radio begins to lose control, and I make a note of this distance for future reference.

If you cannot get at least 50 feet of range, do not fly the helicopter. If you experience a range problem, one thing to check is the location of the receiver antenna in the helicopter. If it's wrapped around metal or other radio components, there's a possibility that there will be a loss of range. The preferred method of routing the receiver antenna is to have it exit the body immediately without coiling around any part of the helicopter. You should have a tube mounted to the landing gear struts away from the exhaust side of the helicopter and let the antenna pass through the tube, the excess dangling behind the landing gear. If you don't have

this tube, tie the antenna to the tail boom with a rubber band. If you use this method, be sure that the antenna hangs loosely so that there's a curve to the antenna along its length. This will prevent the antenna from picking up metal noise from the helicopter. Other reasons for low radio range include low battery charge, or a poorly tuned radio system itself. At any rate, be sure that you have the proper radio range before attempting to fly.

The last item on the list is to check each control on the radio system to be sure that they're all moving in the proper direction. Check over the transmitter for any switch that may have been inadvertently changed. It's very important to become familiar with the helicopter radio systems on today's market. Be aware of all the switches and dials on the transmitter so that you'll know if something should be turned on or off. One of the most common mistakes is not checking the throttle-hold switch before trying to start the engine. By the way, the throttle-hold system should be adjusted so that the engine just idles dependably. This way if the engine is started by accident, it won't go off at full-throttle and perhaps cause an injury. Other things to look for include inverted-flight switch active, hi-idle on, ATS system on and out of adjustment, pitch trim not centered, dual-rate switches in high position (for now), gyro sensitivity set to the low end, and all other switches checked to be sure they're in proper position. With this taken care of, let's fuel-up the tank and move on to the first flight!

The First Flight. This is the part where things can get crazy. Before you get ready to start the engine, brace yourself, and expect the unexpected. It may provide some peace of mind if you have an attitude of anticipating problems at first. For one thing, you'll have to learn your engine starting techniques and be aware of what your engine needs before it starts. The first time the engine is started, there's a good chance that it will be balky. This is

lenge

due to the fact that it's new and hasn't been adjusted for use in the helicopter. Hopefully, you'll have run the engine on the test bench and have broken it in per the manufacturer's instructions. If this wasn't possible, be sure to open the main needle valve about three turns from fully closed, and check to be sure the throttle is in the low position. Now, turn the radio system on and move the throttle stick to the low position. Connect the glowplug ignition cable and get a hold on the electric starter. Be sure that the starter is connected to allow the engine to be turned over counterclockwise. I'm assuming that you're looking down at the engine and not from behind it. Next, place



When test-stand running, have helper operate Tx so that needed adjustments can be made.

the electric starter on the starting shaft or hook it into the starting belt. Do not apply pressure to the cone or belt yet. As you squeeze the electric starter switch, apply pressure simultaneously to the cone or tension belt. Also, be sure to have the engine rotated away from compression so that the starter will be able to get a head start at turning the engine through the compression stroke. The engine should now begin to turn over with the starter, and if you're lucky, it'll be running. If the engine turns over yet refuses to start, watch the fuel tubing that goes into the carburetor. See if the fuel is flowing into the engine while it's turning over. If fuel isn't flowing into the engine, open the throttle slightly and try again. If there still

isn't any fuel flow, disconnect the glowplug ignition and open the throttle completely. Turn the engine over with the electric starter and watch the fuel flow. There should now be fuel in the engine, if not, open the main needle valve and repeat until there is fuel flow. Be sure that the throttle barrel is moving with the throttle stick. If it isn't, you have your throttle-hold switch on: turn it off.

If the engine refuses to start, check the glowplug by removing it and connecting it to the glowplug ignitor. The plug should glow bright orange. If it doesn't, check the ignitor batteries or replace the glowplug with a new one. It's not unusual for a new engine to burn out a plug after the first few runs.

The engine should now have started and be idling. Once you have the engine running, carry the helicopter to a safe spot for the initial run up. You should hold onto the rotor head on the helicopter during the starting procedure in case the engine flares up and engages the clutch. You'll be able to hold the rotor head even if the engine starts at full throttle: but you have to be ready for it. Like I said earlier: expect the unexpected!

Now that the helicopter is on the ground, move away from it about 15 feet or so for safety reasons. Place the nose of the chopper into the wind and stand behind it at all times. Gently increase the throttle stick to the point where the rotor blades begin to turn (if they're not already turning) and hold this spot for a few moments. When the blades begin to turn, increase the throttle slightly to get the speed of the rotor blades to the point where they swing out to flying position. Watch the chopper and listen for any grinding or noise which may indicate a problem. If you should hear such a noise, stop the helicopter immediately. If all's well, run the engine up a little at a time until the chopper starts to become light on its feet. At this point, back off the throttle slightly and have an assistant watch the edge of the rotor disk. He'll be looking for



Happiness is a well-trimmed machine, as Ron Zawistoski clearly shows.

something called blade track.

Blade track is the condition of the rotor disk at flight speed. By watching the rotor disk from the side (looking at the tips of the rotor blades), the two rotor blades should appear as one. If there's a separation between the blades, it will be necessary to correct the blade track. As a rule of thumb, adjust the rotor blade that's low to bring it up to the other blade. Adjustment of the rotor blade is accomplished by turning the last universal ball link to hook closest to the rotor blade. Normally, one full turn is good for about 1/8-inch of rotor track. Always stop the rotor head completely, adjust the track, and repeat until it's perfect at just below lift-off speed.

Now that the blades are tracking, it's time to begin to get a feel for the sticks and how they move the helicopter. Run the rotor speed up to the point just before lift-off and practice moving each control. Make only slight movements of the control sticks and watch the helicopter's motion. Practice at this point until you're confident of the purpose of each control. Do not attempt to lift the helicopter into a hover, as you will not be ready for this step. Limit your lift-off to short hops of less than 6 inches and set the helicopter back on the ground after lift-off.

Craig Hath, c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897. ■

FUN-FLY

(Continued from page 82)

from Robbe Model Sport for putting on one of the finest chopper demonstrations I've ever seen. Hats off to Albert Estraviz from Pan American International for showing us exactly how tough the EZ Laser is (by creaming some guy's Ugly Stik in a head-on crash that could have been in the movies). A special thanks to Lacsa Airlines for getting us there. And

last, but not least, we should all give a big thanks to Julio Pastora for having the foresight and energy to stay with the program till it worked.

Next year, there'll be 75 of us going down to Costa Rica. Would you like to join us? Write to me care of this magazine and I'll put you in touch with all the right folks. It's a lot cheaper than you think—and a whole lot more fun than you'd ever expect.

The following is a list of the various awards and winners:

Best of Show—The Cloud Dancers, Kissimmee, Florida.

Best Scale—Manuel Espinoza, Costa Rica, Bellanca Decathlon.

Best Finish—Julio C. Pastora, Costa Rica, Air Champs Models Tucano.

Best Helicopter—Dave Darr, USA, Schluter Champion.

Most Aerobatic—Cloud Dancers, Kissimmee, Florida, The Flying Machines.

Best Silent Flight—Fernando Chavez, Costa Rica.

Best Sport Plane—Cloud Dancers, Kissimmee, Florida, Parachute Plane.

Best Crash—Jose MaVolio, Costa Rica, Trainer 40.

Special mention to Tucano as it won Best Finish right out of the box.

Sponsors—Lacsa (the airline of Costa Rica), Irazu Hotel (home away from home), Ron Rico, Coca-Cola, Cerveza Tropical, El Hobby Shop.

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EAA BIPE

(Continued from page 65)

are ¼-inch balsa sheet. Glue all the parts together, sand smooth—and that's it.

WINGS. The wings on the EAA biplane were built following the written instructions and full-size plan. No problems were noted in this part of the construction. Note that only the bottom wing has ailerons. Once I had both wings completed and had sanded the entire airplane, it was time for covering. I chose to use Aero Span from Balsa USA, which I've used before with good results. Once I had completely covered the biplane, I installed my Eastcraft electric-starter-equipped HB 61.

My Futaba* seven-channel radio was installed without a problem. It was now time to see how much she weighed. My EAA biplane came out at just under 10 pounds, 1 pound of which I figured my starter system added.

A trip to the flying field was now in order; time for field assembly of the biplane, which takes about 10 minutes. Both wings are held by 14 bolts including the N-struts. Once this was completed, she was fueled up.

(Continued on page 80)

Build a **Variable-Rate Charger**

by CHARLIE KENNEY

from Ace R/C

Learn the Basics of Electronics

THIS MONTH I'd like to do a "how to" project, something a bit different from my regular "Control Tower" column. I think that many of our average modelers shy away from electronic construction projects and I hope this column may help change their minds. I've thought about a number of projects to address, but one that I received recently really stood out, the Ace R/C* H/D 500 Heavy Duty Variable-rate Battery Charger. Designed by Mike Dorffler, this charger is most versatile and will charge anything from a 100-mA cell to twelve 5000-mAh cells. It will also charge a 12-volt starting battery or 12-volt lead-acid cell battery.

First, read the instructions thoroughly. I usually start with the PC board. To prepare a PC board for construction, it will be handy to have denatured alcohol, a toothbrush, and 0000 steel wool. Normally, a kit PC board is provided with tape covering the foil side; and simple cleaning with alcohol and a toothbrush is adequate. If the board is oxidized, a cleaning with steel wool followed by alcohol will be in order.

All component holes should be cleaned out with a scribe. When preparing to start component assembly, the following tools and accessories will be quite handy. First and foremost will be the selection of a proper soldering iron. For small work



Extremely versatile Ace R/C H/D 500 heavy-duty variable-rate charger handles anything from a 100-mAh cell to twelve 5000-mAh cells.

such as small printed circuit board assembly, I recommend the use of a Weller WM-120 12-watt soldering iron or equivalent. If you need more heat for the transmitter or battery pack assembly, an Ungar 35-watt iron is better suited. There are also specialized tools available which make the job easier. One is a simple clip-type clothespin which can be mounted in a small bench-top vise. You will find many times when soldering small PC boards that a third hand is necessary and the clothes clip works just fine. Inciden-

tally, use rosin core solder, never acid core, and the small diameter (18-gauge) solder. A pair of diagonal cutters, such as the OK Machine and Tool Co. MS-10 mini shear, are helpful. I recommend Ungar No. 2 Super-Wick desoldering braid or a vacuum one-shot pump for removing solder bridges, such as the OK Machine and Tool Co. DP-1.

Proper soldering technique is learned more quickly. First, never snip the leads of a component before it is soldered in place. I usually put three or four compo-



Far left: Both medium and small soldering irons are needed. Middle: All-important tools—cutters, heat sink, two types of solder remover (wick and vacuum pump). Left: Other tools required for PC board assembly.



Kit parts as received from Ace R/C, not a difficult kit.

nents on the board, then solder them in sequence. By spreading the leads slightly, the component can be placed at the proper height above the board.

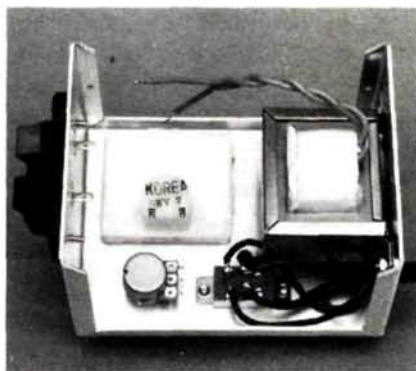
The soldering operation should be performed in the following manner. Make sure the tip of the hot iron is clean, then hold the tip of the soldering iron so that it touches both the circuit board foil and the lead. Place the solder carefully between the tip and the joint being soldered. Don't hold the iron in place too long. As soon as the solder melts and flows, remove the iron. When the solder is cool, inspect the joint. A good solder joint is smooth and shiny; a bad joint is dull and lumpy. Bad joints most often result from not heating the joint long enough before applying solder or removing the solder too rapidly or moving the joint before the solder cools. Reheat a bad joint and it will usually turn into a good joint. Clip the leads as close to the board as you can using small diagonal-cutting pliers and finally inspect each joint with a magnifying glass or a jeweler's loupe after cleaning all the solder flux residue off with denatured alcohol and an old toothbrush.

The next problem in undertaking a construction project is the identification of the various components that are to be used. The first and most common are resistors. These are relatively small devices when they are used in low power applications, usually $\frac{1}{8}$ -, $\frac{1}{4}$ - and $\frac{1}{2}$ -watt configurations. The resistor itself has a small cylindrical body with two axial leads. There are usually four colored bands around the bodies of all resistors. The first colored band is normally closest to one end of the resistor body and gives a first digit of the resistor value. The second colored band gives the second digit of the

CONTROL TOWER CHART

RESISTOR COLOR CODE

COLOR	1st BAND	2nd BAND	3rd BAND	4th BAND
Black	0	0	1	
Brown	1	1	10	
Red	2	2	100	
Orange	3	3	1,000	
Yellow	4	4	10,000	
Green	5	5	100,000	
Blue	6	6	1,000,000	
Violet	7	7	10,000,000	
Gray	8	8	100,000,000	
White	9	9	1,000,000,000	
Gold				5% Tolerance
Silver				10% Tolerance
None				20% Tolerance



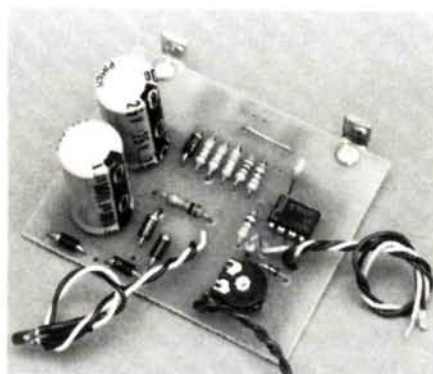
Discreet parts assembled on chassis. Addition of PC board will complete unit.

resistor value and the third band gives a multiplier of the zeros which must be added to determine the value of the resistor. Gold is 5% and silver is 10%. Thus, a resistor coded red, red, brown would be a 220 ohm resistor and if the fourth band was gold, it would be a 5% resistor. A table of the resistor color code is shown.

For capacitors, there are many different configurations. There are disc capacitors, tantalum and electrolytic capacitors. The disc-type capacitors normally have a marking on their side which can be readily identified. Tantalums are polarized and always have a positive end which is usually identified by a red band; or sometimes the positive end may be rounded or marked with a plus (+). The capacitor value is normally printed on the side. The color code can be the same as for resistors with the first color being the first significant number, the middle the second significant number, and the third

the number of zeros.

Transistors come in various configurations. Most of the low power devices are some sort of a flatted cylindrical configuration where the emitter, base, and collector leads come out of the underside. Larger higher-power transistors usually have a heat sink and are physically connected to the PC board for good conductivity. Diodes approximate the



Assembled PC board; a total of only 20 components is required.

size of small $\frac{1}{4}$ -watt resistors and normally have either a black or white band or a shouldered end to indicate the cathode. Most diodes are glass so care should be taken in their handling. Light-emitting diodes (LEDs) come in various sizes and colors. Their cathodes are usually identified by either a longer lead, a different lead, or a notch or flat spot in the case. Lastly, integrated circuits always have an identification to locate pin number one of the IC. It's either a notch in the

(Continued on page 115)



Golden Age of

by HAL "PAPPY" deBOLT

WHILE AT THE FIRST FAI World R/C Championship in Zurich, Switzerland, we had a chance to evaluate the competition when the model check-in came, the day before the flying was to start. This was an exhibition of state-of-the-art R/C in 1960.

What had been expected and was sadly lacking was a Russian team. With all the FAI records they held, their equipment would have been of great interest. The rumor was that after evaluating the entries the Russians felt that they would not be competitive. The credit for the greatest valor and ambition went to the Czechoslovakian team. Conditions in their country forced them to hand-make every bit and piece of their models, radios (coils, capacitors, resistors, you name it!), and engines. Balsa for models was more precious than gold. As they were under the constant scrutiny of their Russian team manager, there was no fraternization! Naturally their models were simple with only rudder and engine controls. Even so, they would not be alone as some of the other entrants had little more in the way of sophistication.

An entrant who drew great attention was Steigmair of Germany. His model was of the Custom Cavalier style, powered by the German Ruppert "Boxer" twin diesel, a popular engine among the Europeans. The major interest was in his

home-built radio which had helped him to the European Championship. He had developed a discriminator and actuators which used vacuum for power in a proportional fashion. The system was complex but seemed flawless in operation. His flying was closely observed.

From their past performance record the British were thought to be strong contenders. Their perennial champion, Chris Olsen, always did well with his simple Uproar design. The best modern comparison would be the Live Wire Jenny. He used a .29 glow engine. His colleague Stuart Uwins also flew an Uproar variation. Frank Van den Bergh, the third member, used a modified Astro Hog, one of only two low-wing designs outside of the American team. This was a solid, competitive team!

The other low-wing was by Dr. Gabeaux of Belgium, which was an original featuring polyhedral. This certainly was a time of learning. As for the rest of the field it was a complete mixture of that day's R/C types. Mostly cabin- or shoulder-wing styles with radios from simple single-channel to rudimentary reeds. The highest scores would be made with top-of-the-line reed systems. Obviously some were only there for the enjoyment and to observe.

Before we continue the saga of the first FAI World R/C Championship, some information about the introduction of Ni-Cd batteries to R/C. Many may not realize that the first stepping stone to



deBolt's FAI Bipe on its only championship landing approach. Yes, a last-minute correction did put it in the circle for a score.

modern R/C was the transistor, and the second was surely the Ni-Cd battery.

It answered several needs. Many early radio failures were caused by dead dry cells; and buying dry cells, like Russian Roulette, left you in suspense as to whether they were live. So, something better was desperately needed!

Who first used Ni-Cds for R/C?—we don't know. We do know, though, that some of the final reed systems were supplied with them. We also know that Dr. Good and some of his DC/RC cohorts were using "Silver Cells," which



Van Der Bergh of England's World Champ entry, one of only two low-wings not from U.S.



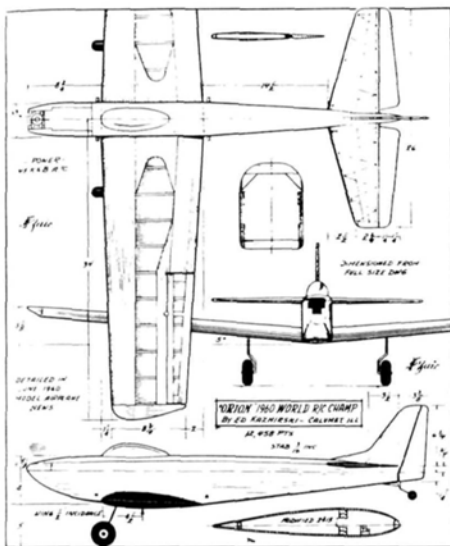
Hal deBolt and ill-fated Stitts Playboy, version of his popular pursuit design at Dubendorf.



First FAI R/C World Champion, Big Ed Kazmirski with his later-day Taurus.

had similar characteristics and were rechargeable, too. It was the Ni-Cd which allowed the successful development of the propo systems. Without them the chore might have been endless.

Today, Ni-Cds are taken for granted. Besides the economics of recharging, what was the needed and desired asset? Dry cells were the battery of the day, much as they are for many things today. We'd even seen some improvement in longevity with some changes in chemicals. However, today's alkaline cells would only provide a partial answer, until the advent of the Ni-Cd.



Kazmirski's World Champion Orion. It would stand R/C on its ear as a top flight contender.

A new dry cell is full of electricity (current) that is under pressure (voltage). When the electricity is drawn from the battery, the pressure decreases proportionally, just as it does when air leaves a tire. Thus, both current and voltage of a dry cell begin to diminish, equally, the moment the battery is put in use. This process continues until the battery is dead. A dry cell is at its greatest advantage when the lowering voltage will not be a problem as the cell is drained.

A radio circuit serves to supply the desired electricity to each of its components. The supply source is always greater than the need of the components. To

supply the various components' needs, "dams" (resistors) are inserted between the supply source and the components to pass the precise amount of electricity required by each. The amount a resistor will pass is controlled by the voltage or push it gets from the supply source. Thus, optimum operation only occurs with a constant supply-source voltage.

You should see that a dry-battery-supplied circuit must tolerate a wide voltage range if it is to be dependable. Such a tolerance is usually not compatible with precise operation. R/C needs precision.

The Ni-Cd battery is a much more stable source. The push (voltage) against the current will remain nearly constant until the cell is almost drained. This constant voltage is just what is needed for precise circuits, obviously a great advantage to R/C.

The Ni-Cd battery was apparently developed in Germany and imported into the USA by the Gould Corporation. Physically, the first cells looked like miniature discs, and were labeled "discs," about the size of a silver dollar. Also aptly named "button cells," they were rated at 1.2 volts and 500 mAh. One side of the disc was positive, the other negative. The sides had welded tabs for connection.

Generally they would be stacked and the tabs welded to create a 4.8-volt pack. The cells would be in a tube-like package or held together with heat-shrink tubing much as we see done today. Outside of their obvious size and weight, there was nothing wrong with the button cells; they proved a godsend to R/C.

The first step toward today's batteries came when Union Carbide developed their patented Ni-Cd which packaged the 500 mAh in pen-cell form. This lighter and more useable package suited R/C much better. As you know, this is still a popular battery.

Well, we broke off the first FAI World R/C Champs story at the preflight check-in. Naturally, our American entries were drawing their share of attention. If there

was ever a World Champs where one team seemed to be head and shoulders above the others, this first one would be it. The American team simply had superior radios, aircraft and more seasoned pilots. The quality, design and appearance of the American entries were greatly admired. Much attention was paid to our low



First Gould (button cell) Ni-Cd battery as packaged by C.G. Electronics. Larger one is 500 mA, smaller is 250 mA—too small for early R/C.

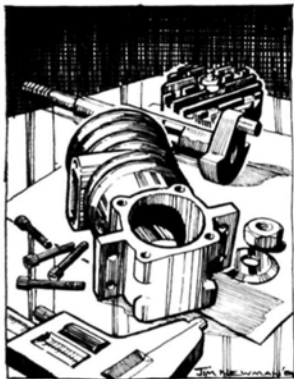
wings, and we even had a biplane! After consultation with team manager Dr. Good, it was officially determined that Dunham's primary entry would be his Voltswagon; deBolt would use his Stitts Playboy and Kaz's only choice was his Orion. We had great confidence, but what was not anticipated was how fate can change the best-laid plans.

If the objective of an aerobatic championship would be for each pilot to perform the aerobatic schedule to the best of his ability, then the fallacy of the FAI 2 flight-only system would be quickly pointed out. This method would never be used again.

The first day of the meet dawned bright and clear but unseasonably cold. With the brisk breeze you needed heavy jackets! Test-flying had been under way since dawn, the American team not participating. But official flying was held up for spectator arrival. Five thousand would attend. The weather on the second day would be milder, almost perfect.

Designated to be the first American to fly was deBolt, followed by Kazmirski and Dunham. The first flight of the Championship was put up by Dr.

(Continued on page 102)



About Those Engin

by JOE WAGNER

TIMES CHANGE. Facts don't alter, but the way we think about them often does. A good example of this is the attitude of many people toward the cleanliness of their model airplanes.

It's always been good practice to keep an airplane neat and clean. But the efforts of today's modelers to keep their airplane finishes free of any oily film whatever has had some detrimental effects on their engines.

Two-cycle motors have always had lubricants mixed with their fuels. This, of course, makes for an oily exhaust. But for the first 40 years or so of model aircraft powerplants we fliers cheerfully put up with the greasy residue their slipstreams distributed all over our airplanes. Rags and paper towels were cheap—besides, the oil film helped keep the doped finish from getting brittle.

But now the attitude is different. Modelers today take special precautions to keep their models oil-free. They use fuels with synthetic lubricants, primarily because these leave less of a mess than castor oil does. They complain of muffler gasket leakage; not because it affects the noise level (it doesn't), but because it lets messy oil get on their airplanes. They even add long lengths of plastic tubing to their muffler outlets, to carry the exhaust far away from the model itself.

Sure, all this does cut down on the washing and wiping. But it doesn't help the engine one bit.

First, castor oil is the best available lubricant for miniature two-cycle engines. The same tenacious oiliness that's so hard to remove from external surfaces is what provides superb protection to the internal parts. You never see a rusty ball bearing in a motor that's been run only with castor-lubricant fuel.

Second, mufflers are included with modern R/C engines not merely to cut the noise output. They also serve the important purpose of retaining heat in the cylinder to help the idling performance.

The previous generation of mufflerless



A Black Knight .25 spark-ignition motor manufactured in California a few years ago.

R/C engines had baffles on their exhausts. These were coupled to the throttle actuators so as to rotate in synchronization with the throttle. Thus as the engine ran slower, its exhaust was restricted and heat within the cylinder was retained.

This kept the glowplug hot, so that when the throttle was advanced the motor would pick up speed without faltering. At the same time, the exhaust baffle opened, allowing free "breathing" again—and free escape of the cylinder heat.

Modern R/C engine mufflers serve somewhat the same purpose of retaining heat within cylinders for smoother idling. However, unlike exhaust baffles, they restrict outflow all the time. This means that they hold heat inside the engine even at high speed—I should say *especially* at high speed.

Heat is both a friend and a foe of internal-combustion engine performance. It provides the energy that powers the piston and turns the crankshaft; but it also softens and distorts metal, and carbonizes lubricants. We need it to *run* our engines; we don't need it to *ruin* them.

That's why adding a couple of feet of vinyl tubing to a muffler outlet may not be such a good idea. The extra restriction to free exhaust outflow will make the engine run hotter—maybe much hotter.

As I've mentioned in previous columns, I recommend adding extra

castor oil to glow fuel. A modeler I know did this at my advice, but recently told me, "I'm not going to any more. It makes too much of a greasy mess on the airplane!"

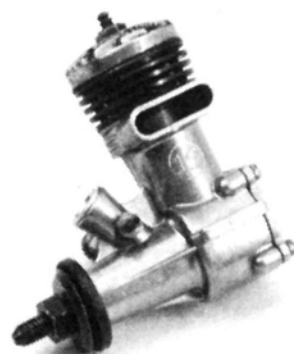
"But it will help your motor last a lot longer," I said. "Castor oil is a far better model engine lubricant than the synthetics, and adding extra castor will give you insurance that an accidental lean run won't destroy your engine."

"If I ruin my motor I'll just buy a new one," he replied.

That attitude doesn't make sense to me. Maybe it's because I had such a difficult time obtaining model engines during the Depression, when I was young. Then a Brown Jr. cost more money than my Dad earned in a week! But whatever the reason, I've had a long-standing respect for precision machinery, and I cannot see the logic of letting a good-running model engine wear out or overheat, just to avoid a little oil on the airplane.

For one thing, if you ruin an engine, you have no assurance that a replacement will be available. Motors go off the market all too often! For another, it takes a lot of time and trouble to get an engine fully run-in and perfectly adjusted. Once it's performing exactly right, it makes sense to me to keep it that way as long as possible.

Besides, any model engine ought to



The "magic motor," K&B's .19 of 1951, was unsurpassed for power yet easy to start.

outlast several airplanes. Mine surely do! I'm content to put up with the oily coating on my models—which isn't a big job to clean off anyway, using warm water, dishwashing detergent, and lots of paper towels.

I don't do much any more in the way of reworking or repairing model engines for others. I used to do a lot of that years ago, but discontinued it from lack of time. However, I have a few old-time modeling friends who turn up here once in a while with an engine problem. I can't very well refuse to help somebody I've known for over 20 years!

Anyway, a few weeks ago an old buddy came around with a brand-new K&B .20 R/C Sportster. "I haven't tried to run this at all," he said. "It just doesn't feel right. Should I send it back to the factory?"

The engine didn't seem right to me, either. It felt as if it had fine grit in the piston-cylinder area. So I took it apart. Nothing was wrong inside; all the parts were perfect as far as I could see, and smoothly finished. There wasn't a trace of any foreign matter, either. But when reassembled, the motor still felt as if it were lubricated with toothpaste.

"Before you send this back," I said, "I'd like to try something that can't hurt the motor at all, and may help."

Getting the go-ahead, I removed the glowplug, flooded the motor with 3-in-1 oil, and clamped the shaft in the jaws of my lathe chuck. At the slowest speed, I let the lathe drive the engine for about 5 minutes. Then I put the plug and prop back on and tried hand-flipping again.

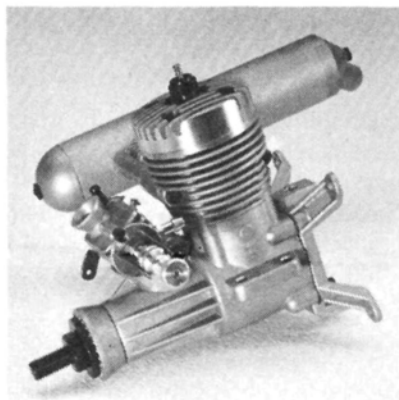
It felt noticeably better. I put it back in the lathe (less plug, of course), re-flooded it with oil, and ran it at a higher rpm for another ten minutes or so. After that the K&B felt so much better, I thought it was worth a try on my engine test stand.

And it was. The K&B started right up with a couple of hand flips (on 10% nitro fuel) and ran smoothly. I put several very rich runs of a couple of minutes each on this motor before trying to lean it out.

When I did, it continued performing perfectly, and its response to throttle movement was excellent. Besides, by this time much of the gritty feeling was gone.

I told my friend that I thought his engine was okay now, and would improve even more with further running. I couldn't explain what caused the odd way the engine had felt when new, though.

Later I bought one of the .20 Sportsters for myself, because I liked the way my friend's motor turned out. The more he ran it the better it got! And the engine I



K&B's new .20 R/C Sportster has an unusual "feel" but runs well and is quiet.

purchased felt exactly the same when new as my buddy's had. The identical sensation of fine grit in the cylinder showed up when I turned my new K&B over.

Again I used my 3-in-1 oil, lathe-driven break-in technique. And I got the same results. Thus, it's my belief that the gritty feeling of the two K&B .20 R/C Sportsters is natural; a result of the unusual arrangement of an aluminum piston running in an aluminum cylinder.

I've been a fan of K&B engines for a long time. The spark-ignition K&B Torpedo of 1946 was a prize-winner right from the start. And K&B was first with the 1/2A engine: their little .020 Infant came out in the early spring of 1949 and was a sensation.

Perhaps the best of K&B's pre-R/C

engines was the .19 of 1951. John Brodbeck (the "B" of K&B; who's still in charge of the company today) used to call it the "magic motor." It could do anything! It set speed records in U-Control contests and was the hottest Class A free flight engine of its day—yet was so docile any beginner could run it.

Yet there was nothing radical in its construction. It had a plain sleeve crankshaft bushing and a lapped Meehanite piston running in a soft steel cylinder. But it easily outran McCoy's Racing Redhead .19, which was a ball-bearing, ringed aluminum piston design.

K&B's .19 dominated Class A model competition for five years. No other engine manufacturer could beat it—and one of them in frustration came out with a .25, in order to match the performance of the Torpedo .19. The "magic" was tough to duplicate!

More recently, K&B's reputation for model airplane engines declined somewhat; partly because of the company's several changes of ownership, and partly because of some pesky problems with their R/C carburetors.

However, John Brodbeck's resuming ownership of K&B has eliminated one of these difficulties. The other problem has been solved by a brand-new K&B carburetor design. Thus, the R/C Sportster engines (available in both .20 and .45 displacement) appear to be the forerunners of a new line of top-quality motors from an All-American model engine maker who has been in business continuously now for 41 years.

**The following is the address of the company mentioned in this article:*

K&B Mfg. Inc., 12152 S. Woodruff Ave., Downey, CA 90241. ■



R/C News

by ART SCHROEDER



Ray Vaillancourt took first place in giant-scale at the FLYRC "Wings of Spring" static show. This P-47 has been demonstrated at numerous IMAA affairs around the east coast.

R/C AIRPLANE flying can best be described as America's "secret hobby"—very few noninvolved people know we exist. We're so far back in the "closet," we're nearly impossible to find.

Unfortunately, some do find us, usually as a result of noise we generate. This discovery process often results in lost fields and terrible public relations—a topic I've often discussed.

However, in late July we were discovered by millions of Americans in a positive way as a result of a segment on ABC's "Good Morning America." The segment was a report on Byron Godbersson (Ida Grove, Iowa), Byron Originals, and model aviation. It is the first TV network coverage of model

aviation I've seen in years. It's true that there is regional coverage from time to time on our activities and the Public TV Broadcasting/National Geographic program on modeling last year was a fine effort; but national coverage has been a rare happening.

"So what?"

It is television that can best show our activity in its best light and it is TV that can reach most people with a positive message. Our sport deserves its share of TV coverage and it's high time we had some. In the Byron piece, model aviation as an industry and hobby activity was shown to be mature, entertaining and often spectacular; an activity carried on by responsible, dedicated adults. I believe such will do model aviation a great

service and hope to see more and more.

As reinforcement, I've heard more comments from nonmodeling friends on this five-minute exposure: "I never knew those model airplanes were so realistic—they sure aren't toys!" But we've known that for a long time and now millions more know the same thing thanks to Byron. A half hour of Byron's incredible *Striking Back* would be just right for an ABC follow-up.

Grassroots Efforts Still Pay

It isn't just presentations on TV that will help R/C grow and prosper; much can be done by individuals and clubs.

Individual R/Cers help by talking our hobby/sport up in general conversations. One must go easy on this lest a listener



Danbury Airport hangar served as the venue for FLYRC's "Wings of Spring."

becomes bored with our missionary zeal. We should invite friends to view our flying. Often we can pick up a convert. At least we should try to present our spare time activity as a great alternative to golf or a way to avoid becoming a couch potato.

It is really at the club level that so much good for our hobby/sport is being done. Clubs sponsor contests that draw many spectators and not all are modelers. Clubs work with schools and youth groups. Clubs present mall shows that expose our activity to thousands. Often clubs sponsor or help develop one of AMA's most

(Continued on page 87)



The airplane at "Wings of Spring" that was selected by the judges as Best of Show was this fine Bucker Jungmeister by Chauncy Dance.

Field & Bench Review

A new generation of lightweight
ARF electrics.



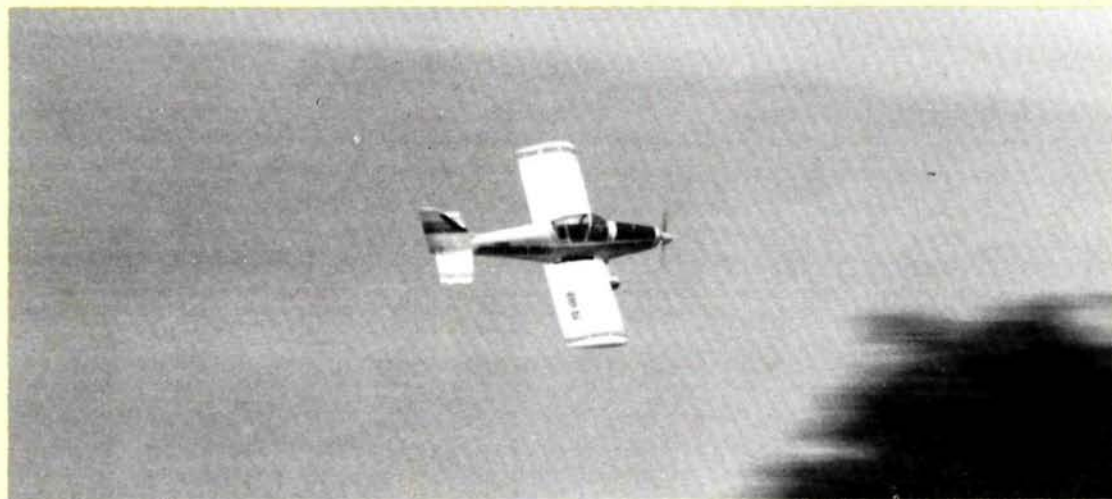
PETIT KYOSHO **ROBIN** 850 by RICH URAVITCH

THE ROBIN 850, built by Kyosho and distributed in the U.S. by Great Planes Model Distributors*, represents a new approach to the steadily gaining popularity of electric R/C flying. Rather than just float around like many of the other light-wing-loading electric designs, the Robin is designed to provide spirited performance while retaining all the advantages of electric flying—especially the clean and quiet aspects!

THE KIT is ultra-complete with everything except the radio and adhesives. And I mean everything. Included are the LeMans AP-29 electric motor with its special prop, the 6-volt 450 mAh battery pack and quick charger, which operates from a 12-volt battery. The airplane itself consists of a blow-molded polyurethane, flexible plastic fuselage, cowl, and wheel pants, plus a built-up balsa film-covered

Type: Sport Aerobatic ARF
Wingspan: 33 inches

Radio: 2 channels
Power: RS 380S Mabuchi electric



wing, and a molded hard-foam tail group. The balance of the kit includes all the hardware, canopy, a large sheet of decorative trim, and a 12-page illustrated assembly manual.



Motor mount is figuratively and literally a snap.

ASSEMBLY. No problems were encountered by going by the book. About the only additional thing you'll need to buy will be a female connector identical to the one that connects your normal Ni-Cd flight battery to the receiver. This normally comes off the switch harness and you can cut one off, but I'd recommend that you buy the separate connector and leave your stock harness intact. The reason for this connector is that the receiver and propulsion motor draw their power from the same source—the supplied 6-volt 450 mAh battery! And you thought your receiver ran on only 4.8 volts! So, the same power source, eh? Your next thoughts probably are, *nice full charge, good source, everything works fine, motor uses all the current, stops, and the plane flies away. I'm left with a useless transmitter.* Well, Kyosho has saved us from ourselves by incorporating an auto-cut-off-relay in

the power circuit. This relay allows the motor to run from two to four minutes and stop with sufficient electrical power left to fire the avionics. You'll get used to this after a few flights, but remember, with Ni-Cds, the power curve drop-off is rather abrupt, so keep your Robin within the confines of the aerodrome—or very, very high!

I used a standard Futaba G series receiver coupled with two FP-S20 mini servos in the Robin for weight saving. Due to the rather diminutive size of the airplane, radio space is at a minimum and I'd recommend that you consider the same setup. While on the subject of radios, although the Robin requires only two channels of control (ailerons and elevator, no speed control)



All of the above are included in kit.

and the directions seem to indicate that a two-channel, two-stick radio is sufficient, I'd strongly recommend that you purchase a four-channel, two-stick radio for the following reasons: two-channel, two-stick units are generally used for cars or boats (surface use) and might not be readily available on aero frequencies but, more importantly, are awkward to use with only

(Continued on page 96)



Cut-away shows balsa construction.

BALSA USA
EAA BIPLANE

by GEORGE WENDT

A fully aerobatic 1/4-scale rendition of a two-wing classic.

I HAVE ALWAYS HAD a place in my heart for biplanes, which is why I chose to build Balsa USA's* Experimental Aircraft Association Biplane.

After building many other Balsa USA kits, I had no doubt that the quality would be first rate and that the finished product would be a good flyer. When my kit arrived, I immediately began to sort through it. The packaging was good and the die-cutting outstanding. There are two sheets of plans and a written

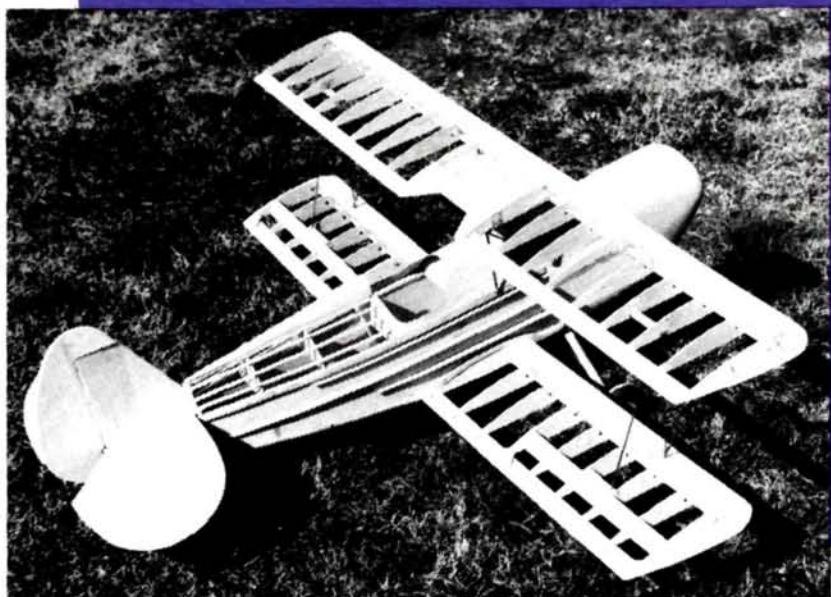


instruction booklet with some nice photos and three-views of the EAA biplane.

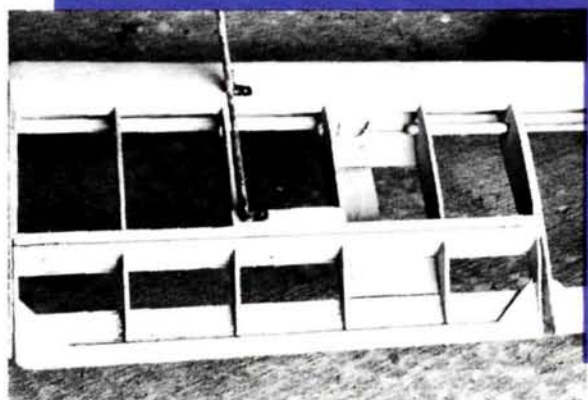
FUSELAGE. The fuselage sides are full length and all that was needed was to add 1/8-inch-ply cabane and landing gear doublers. Next, I cut and glued 1/8x1/4-inch upper and lower longerons in place, then I added the firewall and the fuselage formers to the left side fuselage. Laying it over the plans, I joined both sides of



Type: Scale Biplane
Wingspan: 60 inches
Weight: 7 pounds
Power: .50 to .71 2-cycle or
 .60 to 1.20 4-cycle
Channels: 4



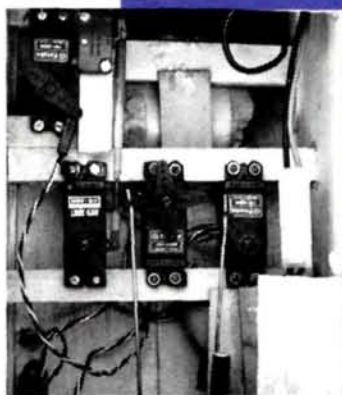
Clockwise from top: Balsa USA EAA Biplane clearly has a well-engineered, solid structure. Wing structure at the aileron hinge point; note strut connection. Fuselage obviously has plenty of room for any equipment. Assembled and unassembled wings are nearly identical.



the fuselage, glued the aft ends of the fuse together, and installed all the $\frac{1}{4} \times \frac{1}{4}$ -inch cross members.

I then sheeted the bottom of the fuselage with $\frac{3}{32}$ -inch balsa and added the $\frac{1}{8}$ -inch-ply tailwheel mount and $\frac{3}{32}$ -inch sheet doubler at the aft end of the fuselage. Once all this was complete, I added the landing gear, put the cabane mounts in place and finished sheeting the bottom of the fuselage using $\frac{1}{4}$ -inch sheet. Adding the bottom wing fillet and all the longerons, completed all but the top of the fuselage. Next, I glued former F-1, F-2A, and F-3A in place, followed by the $\frac{1}{4}$ -inch-square top stringer.

The remaining formers, F-5 through F-10, were added to the aft section of the fuselage. Once completed, I



fitted the $\frac{1}{32}$ -inch plywood forward deck, cut the cockpit opening out, and added all the stringers to the top aft part of the fuselage. All that was left to do was the sanding.

CABANES. Pay close attention to the plans here: this can be assembled backward if you're not careful. Once I distinguished the front cabane from the rear, I then wrapped them using fine copper wire and soldered them as the plans indicated.

Next, it was time to assemble the cowl. Using Hot Stuff Super-T, I glued both sides of the cowl together and sanded the seam smooth. Using the pattern supplied, I cut out all cowl openings and set it aside to begin on the tail feathers.

TAIL GROUP. The fin, rudder, stabilizer, and elevators

(Continued on page 50)

From The Cockpit

T • I • C • O •

W A R B I R D S



One of two truly impeccable F9F-2 Panther jets that showed up at TICO.

Southern Exposure

article and photos by BUDD DAVISSON



THE NAMES of certain places conjure up images of the activity, the color, and the sounds of the events of those places. Oshkosh and Indianapolis are such names. To pilots and modelers who are enamored of big iron warbirds, another of those names is TICO.

TICO is the name of the Titusville County Airport, and it might as well be code for airport-where-fantastic-collection-of-warbirds-gathers-in-the-spring. TICO is home for the Valiant Air Command's yearly big iron bash.

This is not an airshow where a few Mustangs are mixed in with the home-builts, antiques, and Wichita Sheet Iron. This is a show where the only airplanes in the show are warbirds. Big ones, little ones, and not so little ones. This year, the airplanes ranged from funky little L-4 Piper grasshoppers to the most magnifi-



Above: This neat Fouga Magister trainer had all the modelers and aviation buffs scrambling for their cameras. Right: Awesome Skyraiders are always an impressive sight.

The queen of the show was Nine-Oh-Nine, the B-17 to end all B-17s, owned by Bob Collingswood of Boston.

cent B-17 restoration in the country, dubbed Nine-Oh-Nine. At TICO, if it ain't a warbird, it ain't worth mentioning.

I love the TICO show. It is nowhere near as big as Oshkosh and it doesn't offer the variety of Sun 'n' Fun, but it is still one that I look forward to each year. For one thing, its slightly smaller size makes it more manageable for tired legs and heavy cameras. For another, since it is the very first show of the season (being staged in mid-March, the weekend before Sun 'n' Fun), that's where the newest restorations show up

each year.

While much of the rest of the country is still deep in snow, Titusville is bathed in weather that everybody longs for all winter. It is a welcome excuse for many warbird owners to head south (a bunch of them already live in the south) and

dust out the cobwebs. The entire half of the U.S. is represented, and this year birds from as far away as California showed up.

This year had many of us rubbing our eyes thinking we were seeing double when a nearly matched pair of F9F-2 Panther jets broke into the pattern with that power-off moan so

*TICO is
home for the
big-iron
bash!*



characteristic of old axial-flow jet engines. Shades of Toko Ri! The early jets, like the Panthers, are much rarer than WW II birds because there were so few of them built and they were obsoleted and junked so quickly. The Panthers, for instance, never went into the service of any other country, so restorers couldn't go to some Third World nation and pick up a flying Panther for a buck ninety-eight. These two old soldiers were probably ex-playground mounts. Most Panthers wound up either being reduced to dust by kids in playgrounds, taken apart and put together in maintenance schools, or simply abandoned at some scrap dealers. Unlike the Mustangs and Wildcats, not many old Panther drivers lined up at the salvage sales to buy one of their old airplanes. But, here were two of them. Alive and moaning.

The Panthers had to share the jet spotlight with two Fouga Magister trainers which should have had all the modelers scrambling for their cameras. The Magisters are possibly the most logical choice ever for a ducted-fan machine for the beginner. With their long, high-aspect-ratio wings and slender lines, they would fly like a feather and make a great first-time jet trainer. Of course, there is the problem of working out a control mixer for that V-tail.

The queen of the show was Nine-Oh-Nine, the B-17 to end all B-17s. Owned by Bob Collingswood of Boston, the airplane was restored and is flown by Tom Rielley of Kissimmee, Florida. Tom is almost as interesting a story as the B-17 since he has set

The infamous Cripes A'mighty, piloted by Kermit Weeks, leads a squadron of '51s.



up an assembly line for B-25s and is constantly cranking out restored-to-new-condition Mitchells. But, the B-17 is no assembly line job. It doesn't take much looking to realize that Nine-oh-Nine is something special and much

(Continued on page 92)



Magnificent B-25 study, Georgia Mae. It's amazing how many newly restored B-25s are in the air once again.

Field & Bench Review

THE FIRST YEARS of a fledgling pilot are without a doubt some of his most memorable. My recollections are good ones. In the late '60s and early '70s I was the wide-eyed novice learning all I could, with alacrity, about R/C airplanes. I even recall enjoying the scent of glow-engine exhaust: I had it bad! I can also



Hobby Lobby

by CHRIS CHIANELLI

Electric Pronto

A time-proven design turned silent.

remember my first low-wing models, the second of which was a Tidewater Pronto powered by a Fox .25 and guided by an Orbit radio. It's these first low-wing models that make one feel as though he's gotten his R/C "wings" and can now embark on the modeling projects he's always dreamed of.

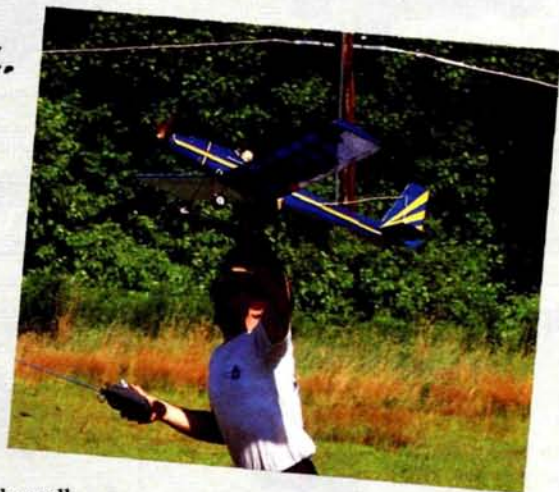
It should come as no surprise that the Hobby Lobby* Pronto has lasted all these years. It features classic, simple construction and a sporty appearance, which cleverly belies the fact that it's nothing more than a box fuselage and an airfoil. It should also be no surprise (considering its 2 pounds and 7 ounces of weight with radio, less battery) that this design was eventually conceived as an electric. The wingspan has been stretched from 48 to 64 inches and the rudder area got an increase to compensate for the greater aspect ratio of the wing.

THE KIT. Opening the box left me with the impression that something was missing, but it wasn't. The simple construction and prefabrication of the kit (sawed parts, including ribs and notched trailing edges) make the contents look clean and concise.

The balsa throughout was far above average but not contest grade. On the whole, the band-sawed parts matched the plans extremely well except No. F4, which was a bit too tall and needed some sanding. The leading edge is formed from a piece of $\frac{5}{16}$ -inch dowel that fits into the pre-cut rib half-moons at the front of the ribs; this feature further strengthens the wings. One of the dowels in my kit was so badly warped that it had to be replaced, but luckily dowels are very inexpensive, somewhere around 60 to 85 cents.

CONSTRUCTION. The plans are quite lucid except for the fact that there's no cross section of F1, F2, and F3. This really isn't a problem

(Continued on page 110)



Light wing loading of the electric Pronto makes hand launches, even left-handed ones, a snap.

Type: Electric sport/trainer
Wingspan: 64 inches

Wing Area: 512 square inches
Weight: 2 pounds, 7 ounces (3 pounds, 4 ounces w/8.4-volt Ni-Cd)

Wing Loading: 14.4 ounces per square foot

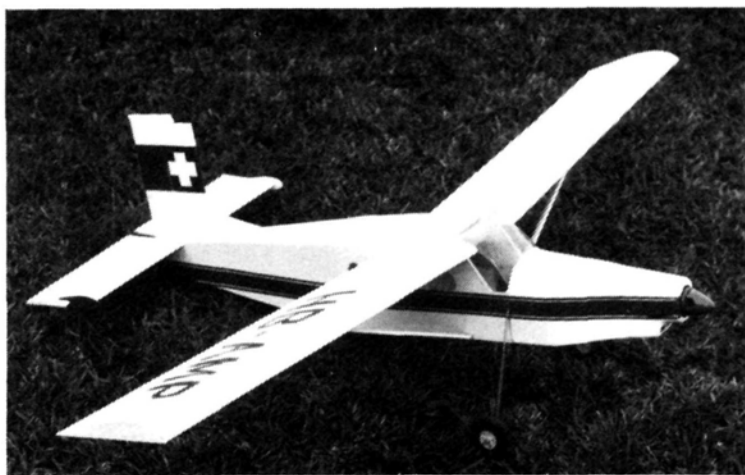


Soaring News

by JIM GRAY

THIS MONTH will be a potpourri of various things pertaining to R/C soaring and other items that have come to my attention over the past month or two, so let's begin.

The cute little Pilatus Turbo Porter shown here is an electric-powered semi-scale model of the original full-size machine. The photo was submitted by Bud Moore in Winter Park, Florida. Bud is a real scale enthusiast and has some very interesting and beautiful scale soaring machines, including a really impressive Schweizer TG-3; in fact, a pair of them finished in different colors. You have to see them in color to appreciate their fidelity, but I'll bet that little Pilatus Porter would really soar great if given some good conditions. I recall soaring



Bud Moore has developed an interesting semi-scale model of the Pilatus Turbo Porter for electric power. The little airplane should soar beautifully given good conditions.

Covering Technique

Mike Harvey sent me a photo some time ago of his Bird of Time, and being quite impressed with the covering job he did, I asked him about it. His reply follows.

"...I first cover the open areas of the wings, tailplane and rudder with lightweight tissue [Silkspan]. I put it on damp, overlapping the open areas by about $\frac{1}{4}$ to $\frac{3}{8}$ inch and stick it on with tissue paste or thinned PVA [white glue]. I let it dry overnight and then give three or four light coats of thinned dope to the whole structure, and let it dry...and then sand it. When the tissue is tight and well sealed, I add a few drops of castor oil to the dope and dope the glass cloth to the whole structure. Then I give it two or three coats of dope, sanding between coats. There is a risk of the tissue sagging underneath and causing wrinkles when dry. To make sure this doesn't happen, I apply the fiberglass cloth with two-part fuel-proofer Tuff Coat, which doesn't soften the dope and is lighter than the resin. It also holds the cloth down as you put it on...unlike resin, which tends to float up away from the tissue. Try it, I think you'll like this tough and taut finish (which can be painted)."

Hand-launched Gliders

I just had a letter from my friend Ron Raymond, who has been working for many years on foam scale models. He mentioned something that has been on my mind for some time—a good and simple means of launching small sailplanes—and suggested an idea that ought to be an improvement over the mini-start or hand-launching for us old guys who don't have the "arm" anymore but don't want to use a small high-start either. Ron suggested an ATLATL or ATL ATL—the Aztec spear-thrower. I'd be willing to bet that some smart cookie could design and build a lightweight spear-thrower that would notch into the tow hook area or maybe into the finger hole in a hand-launched glider and fling that sucker into the wild blue. If someone would care to try it, I'd sure like to hear about it and publish a description, drawing and photo in "Soaring News." Perhaps it would have a means of holding the tail briefly until the launch is under way. Maybe a lightweight aluminum tube that could be made collapsible for storage or carrying would do the trick. Tent poles, for example, can be telescoped and snapped into an extended position by a spring



Bill Rauch holds a Carl Goldberg sailplane. See text.

Ted Davey's little Pietenpol electric one day a few years ago. Ted claimed that it had never been above ten feet off the ground. While he wasn't looking, I managed to catch a thermal and work it up to nearly 1,000 feet. We were both scared because it was so small that it was terribly hard to see. All's well that ends well, so it came back in one piece—right to the field in front of us, and close enough to qualify for a Level I spot!



Warren Plohr (BSS) receives first-place award from CD Bill Christian (SOAR).

button. How about it, readers? Anyone got any ideas of how it could be done? The mechanical advantage of a long "arm" extension could gain even the flabbiest of arms a good 50-foot launch.

Radios

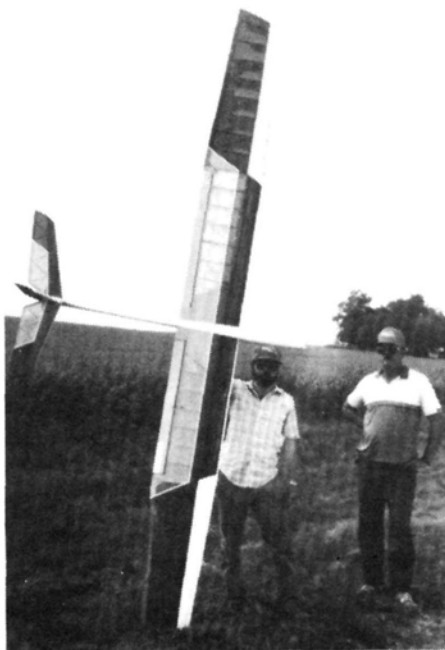
Bill Rauch wrote to let me know about his ideas on radios, and here's what he had to say: "...The change of frequencies this December 20, 1987, had me worried for awhile, but I finally came up with what I think is a workable plan. Since I want to purchase a single stick (and not many manufacturers want to build them), I got some sound advice from some knowledgeable folks. I checked out their suggestions and came to the conclusion that just about all radio receivers on the market today will not be acceptable in 1991 without some work and money. To keep from wasting money, I've decided to wait until next year, when ACE* will have a Silver Seven system on FM with a 1991 receiver on seven channels with Dean connectors so my current servos need not be rewired. I can also get a 1991 receiver for my old AM gear, so that it doesn't have to be rewired, either. This way, I'll fly the Silver Seven on "full-house" planes, and dual stick on Old Timers and gliders with three-channel requirements. I think I'll be very happy with the ACE Silver Seven system, which is due out in late 1987 or early 1988.

That's an interesting approach. Very practical and lower cost than some other options. I think we'd better check with ACE on this and let everyone know about the timing and release of the new gear. How about it Tom?

Incidentally, Bill Rauch constructed a beautiful Goldberg sailplane which now

hangs in the AMA HQ museum. Here's a shot of Bill holding it before donating it to AMA. He says it was donated to the museum only about a week after Carl's last visit to AMA HQ.

By the way, in case you think that the sailplane isn't, let me tell you that one contest at Harris Hill was so windy that nobody dared fly the ridge due to fierce lift and turbulence. Vince Bonnema came up with his Goldberg Sailplane, removed the engine, ballasted the nose with lead, and launched. You should have seen it go! Up, up and away, while all the rest of us stayed on the ground. A few who tried their ships either drifted back and had to land, or folded their wings in the turbulence. That sailplane went up to over 1,000 feet and stayed up for half an hour



Dave Batey and Tom Gressman of MTS team after long 3 1/2-hour flight.

before Vince elected to bring it back! It makes a great sailplane whether powered or not!

The Great Race

Lee Murray sent in some photos and a report on his participation in the Great Race, the S.O.A.R. Club's annual cross-country event. Here's what Lee says about it.

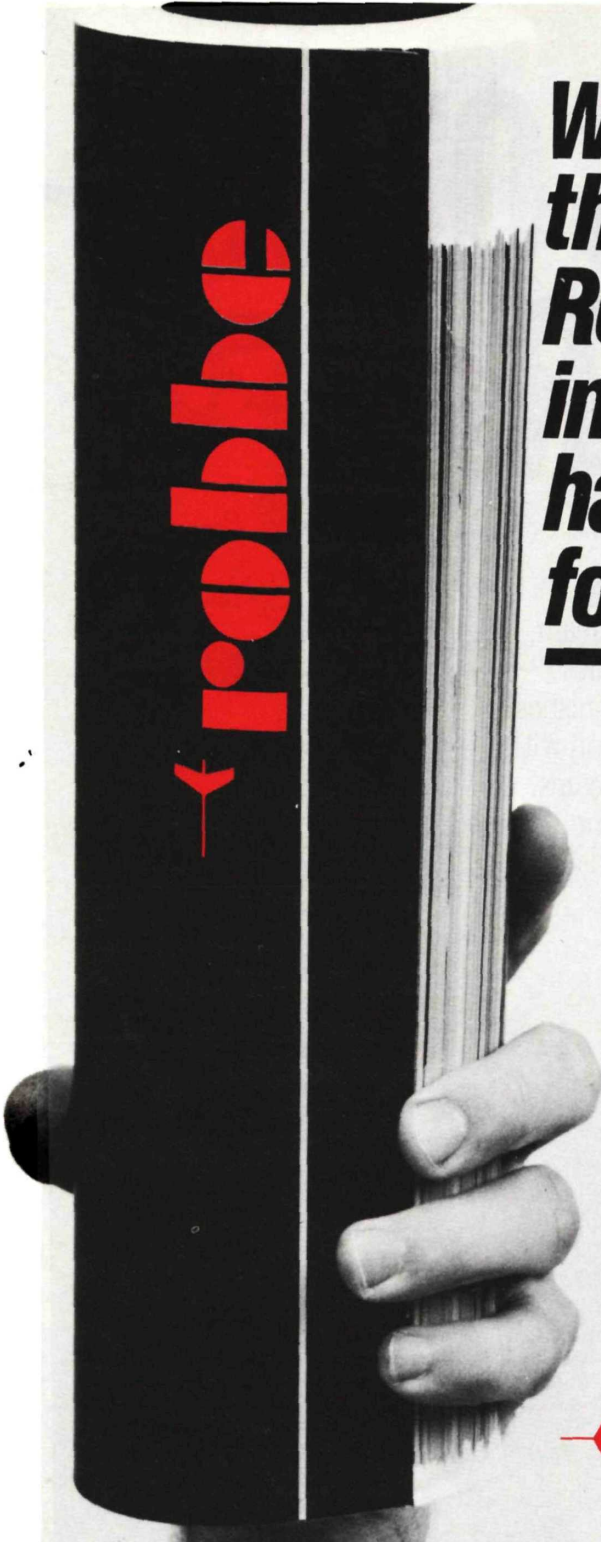
"The 1987 Great Race was a great opportunity for Howard Davis and me to pick up information on the building, design and flying techniques used in



LOFT team with Susie Lipp, Level IV, at the transmitter. They're looking for altitude here.

cross-country soaring. This year 14 teams took to the skies to attempt to complete the 43-mile course over very flat land before the designated time of the day's activities ended. Both days pilots scratched for lift over the sod farm home of the S.O.A.R. club before heading off down the road for the next thermal along the course. The first check point and course turn was at 4.6 miles. Very few flights made it this far. It was suspected that the corn crops which predominated in this area of the course did not generate strong enough lift for most sailplanes which were competing. On Saturday we followed the Milwaukee Thermal Soarers (MTS) around the course with Dave Batey leading the pack for most of the day. Dave's strategy was to use every thermal he hit for as long as it lasted to avoid flying through the sink. This meant use of spoilers for minutes at a time to keep the plane visible. Estimated maximum altitudes were 4,000-plus feet. At three times during Dave's flights, full-size sailplanes joined Dave in a thermal. The beauty of those occasions was incredible and Howard and I grabbed cameras and began clicking. Dave's demise came at 26 miles into the course with a huge patch of cloudless skies. There were no thermals and no indicators of where they could be found. Dave racked up an impressive flight time (3:34) using his strategy. Some time later that afternoon Ken Bates (Ann Arbor Soaring Society) flew past with his thick wing (modified Mike Bame airfoil) giant. It was a day for the floaters and the many Sagitta XCs and high-lift-airfoil ships seemed to predominate in the low-wind, fairly humid, mid-90s conditions.

(Continued on page 116)



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ABM-2

EAA BIPE

(Continued from page 50)

I flipped the switch on my transmitter and off went the Eastcraft starter with the HB 61. I had to stop and start the biplane four or five times. Once all the safety checks were complete and I was sure that all was working properly, there were no more excuses; it was time to see if the EAA biplane would fly.

Taxi test of the biplane was good, so I pointed her into the wind, advanced the throttle, and about 50 feet later, she was airborne. Very little trim was needed to obtain level flight. I made a few low passes for the camera. I gained altitude to find that loops, rolls, and spins were good. Although the EAA bipe doesn't fly fast, it's certainly not a beginner's airplane. It's a highly aerobatic plane, which can be too much for the novice. That's not to say it will snap easily on final: it won't. But you have to keep a decent amount of throttle in hand due to the high drag inherent with bipes. Without a heavy throttle, flying speed will get too low and the model can fall out of the sky!

One comment I overheard at the field praised the bipe as looking great in the air and on the ground. Balsa USA has produced a viable bipe for the sport flier.

**The following is the address of the company mentioned in this article:*

Balsa USA, P.O. Box 164, Marinette, WI 54143.

Futaba Corp. of America, 555 W. Victoria, Compton, CA 90220. ■

HOVERING

(Continued from page 18)

there's usually a great urge to get rid of the training gear too soon.

The High Approach. Another training technique which you may wish to try is the high approach. Get the chopper fairly high (about 30 feet) and practice nose-in hovering. The advantage of being this high is that it takes you away from the ground; the theory being that only the ground can hurt the chopper. Being fairly high will give you both enough altitude and time to recover from most mistakes. And since you're well away from the ground, there's no reason to have training gear. This means you can practice nose-in hovering as part of your normal flying routine and change to another maneuver when you want to.

The big disadvantage of this technique is that the helicopter is more difficult to see because of its altitude, which means it's also difficult to notice small changes

(Continued on page 84)



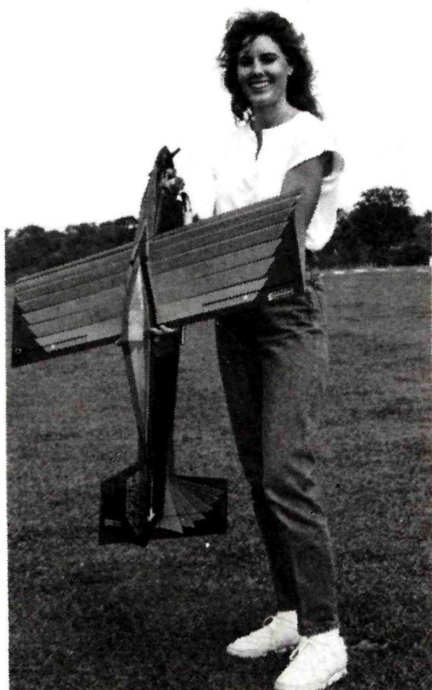
No subversives here, just friendly R/C modelers!



Julio Pastora (holding transmitter) was CD for the event.

Costa Rican Fun-Fly '87

by FRANK TIANO



Andrea Nally of the Cloud Dancers holds a Flying Machine.

SEE IF YOU can appreciate this: it's a Wednesday afternoon and the business phone rings. The operator says she has a person-to-person call from one Dr. Louis DeFrancesco to a Mr. Frank Tiano. "Is he available?" she asks. "I certainly am," I said.

"Well, Frank, it would sure be nice if you could write a few lines, take a couple of pictures. You know, a couple of paragraphs, a few pictures. A roll of film. No make that two rolls. Three rolls. A couple in color, a black and white. We'll have dinner, get some sun. What do you say?"

Friday morning I'm on my way to Miami International Airport to meet the doctor and a few other people. We're about to board a plane for the lovely country of Costa Rica for a few days of R&R and some old-fashioned fun-flying. It seems that *Model Airplane News* had an extra ticket and wanted yours truly to tag along.

I'll spare you some of the details of the trip itself, but I want to tell you, the folks

down in Costa Rica sure know how to organize a fun-fly!

The folks in Costa Rica have national sponsorship from LacsA Airlines (probably the best airline I've ever flown), Ron Rico rum, Coca-Cola, the Costa Rican government, and a host of U.S. companies such as Carl Goldberg, Airtronics, Pacer, Loctite, Polk's, Hobby Shack, Pan American Distributors, and scores of others. *Model Airplane News* brought along hundreds of magazines and plans as giveaways, and the Costa Rican folks really ate 'em up.

The "Fun In The Sun" event is purely a fun-fly—held only in Costa Rica—attended by people from all over the globe. Costa Rica is an ideal place for a fun-fly—great weather, great people, reasonable prices, and a superb flying field. Oh yes, there's another thing that Costa Rica has got besides LacsA Airlines, something that no other country in the world has—a person by the name of Julio Pastora.

If you ever attend this event, you'll undoubtedly hear his name. Julio is the man who has pulled this whole thing



Warren Kronberger from Carl Goldberg Models readies his J-3 clipped wing.

together for the past 8 years, and has really made it work. We're talking dinners at lush plantation houses, banquets at the finest hotels, round-trip transportation to and from anywhere, and anything else you might like to do, just ask Julio.

Julio arranged for everyone to arrive at the same time on Friday, checked us through customs in an efficient manner, got us registered in our hotel, and arranged dinner. Next day there was a bus to get everyone out to the field. Saturday night we were all guests at one of Julio's friends for a colossal cookout. Sunday we had more flying, followed by a neat banquet where everyone who had flown got an award. Then we were asked to stay until Wednesday for some relaxation and sightseeing; a great vacation if you plan for it!

I believe some highlights of the flying are in order. We met two guys from Pakistan, Mufti Habib-Ur-Rehman and Ibrahim Akram. Mufti is the pilot and Ibrahim the co-pilot of one of the largest Saab Safari's I've ever seen. This ship is big time—36 pounds, with a span of 9½ feet. They're running a Kawasaki 3.15 with an OPS 20x10 prop at 5,000 rpm and the thing flies just great.

Then we met one of the local guys, Ricardo Supressa and his good buddy, Mathew Hoffman (an obvious transplant from some other country). Ric was flying a Hoffman R/C free-flight-type that weighed 15 pounds and was powered by a Quadra 35, swinging a Top Flite 18x8 prop. These guys had a ball all weekend.

We also got a look at Eric Dern's scratch-built forward-swept flying wing, powered by a super-quiet stock Super-Tigre 2000 and stock muffler. This thing looked strange but flew like it was on rails. Eric came down from Orlando, Florida, for the week. Also down for the week were the well-known "Cloud Dancers" team and flying carnival act. If you've never seen these guys perform, you're really missing something. These guys are super-talented pilots who work together as a unit. They put on some of the finest and funniest demonstrations I've ever seen. They even have their own kit for sale, the Flying Machine. It's one of the fastest, most maneuverable, strongest fun-flyers on this planet. One of the maneuvers that Don does with this ship is to fly it as far up as he can and do a split-S, so that the thing's coming straight down. And while it's flat out screaming, he does 9 inside snap-rolls at about 80 feet of altitude! If you're like us, your eyes go in the direction of the dive; it took our brains a few seconds to realize the plane wasn't where we thought it would be. In other words, our eyes were going like they do in a tennis match and then the ball would stop in midair! Then, just when we thought we had enough, they put four of 'em in the air at a time and flew formation with 'em. They landed and people were slapping them on the back, when I heard this high-pitched whine, and off goes a Violett Sport Shark piloted by Tommy Velowskey. He proceeded to wring the jet out, much in the same way that Don flew the Flying Machine. I'm talking some serious wringing-out here. It looked as if the fan was going to come through the side of that Shark any minute! But the Shark held together and Tommy put on a great show.

Because of its climate, neutrality (no army), and bonus system for people who retire there, we saw a lot of people from the U.S. who are now citizens of Costa Rica. One of these people is Lee Skaggs, who's originally from California. Lee had one of the prettiest Lasers I've ever seen; it was white and blue and built from an Ulery kit. It weighed in at 19 pounds and had a Sachs 4.2 with ignition advance under the cowl. Lee also brought along his flying doghouse for his old friend and new AMA president, Don Lowe. Don flew a number of planes during the weekend, but the crowd enjoyed the doghouse the most.

I met quite a few local modelers—Julio was forever introducing us to someone. I especially enjoyed helping Fernando

Chaves with his Goldberg J-3 and his Sig Smith Miniplane. The J-3 was no problem, but the Smith needed some nose weight before it would fly properly. Fernando's friend, Manny Espinoza, was flying a new Hobby Shack Citabria. However, what really caught my eye was the 7-year-old Sterling P-63 King Cobra, powered by a K&B 61. I haven't seen one in years.

Speaking of things I haven't seen in years, Eloy Marez was also in Costa Rica covering the event and said that as far as he's concerned, it was the greatest fun-fly in the world. Eloy couldn't get enough pictures of the remarkable semi-scale Laca 727 (not to be confused with a Boeing 727) displayed by Manuel Hernandez, this 14-pounder looked like 75 pounds: until I realized it was all foam! A pusher prop was hand-made and mounted to the K&B 61 for taxi tests.

Julio was flying his old Kaos and invited Don Lowe and me to fly it as well,



Cloud Dancer drop plane powered by two O.S. .90s uses spoilers instead of ailerons. Note upper left wing panel.



North-south runway traffic strictly controlled by Senor Perro Caliente.

but it's hard to look good next to the old master, so I just flew around the patch a few times. Meanwhile, Julio flew his ready-to-fly Tucano (possibly one of the finest offered today), a couple of helicopters, and his very own "Flying Machine." He even flew a skit with the Cloud Dancers.

I'd like to thank Warren Kronberger from Carl Goldberg Models for showing us how a clipped-wing Cub is supposed to fly. I'd also like to thank Dave Varr

(Continued on page 50)

HOVERING

(Continued from page 80)

in the hover position that may require corrective action. Also, since you have to fly into this position rather than start from a rest, it's harder to get the helicopter into the proper position for training to begin and both time and fuel are wasted just flying around.

To try this technique, begin by flying around at your normal pattern height and get comfortable. The elevator trim shouldn't be set with a great deal of nose-down trim, as this will cause the helicopter to fly rather fast and make it harder to stop and keep in a hover.

With your back to the wind, fly the helicopter slowly toward you, raising the

nose slightly to stop the forward speed. Bring it into a hover about 25 feet in front of you and about 30 feet high. This is a position you've never seen before. The nose will appear very high and will not look very comfortable at first. Keep the helicopter there for a few seconds, then add power/collective. Lower the nose slightly and once again go into forward flight with another pattern. On the next pattern, try to place the helicopter in a more exact position and keep it in a nose-in hover for a longer period of time than before. If you should become disoriented or feel that you are losing control, add power/collective and lower the nose slightly to get back into forward flight without losing altitude. The nose may turn and may not be pointing in the direction you want during this recovery, but the important thing here is to regain control of the helicopter without it falling to the ground. Then, come around and try it again. Initially this approach will not seem very comfortable, but with practice it will soon feel better and you'll start to see some results and get your confidence up.

(Continued on page 86)

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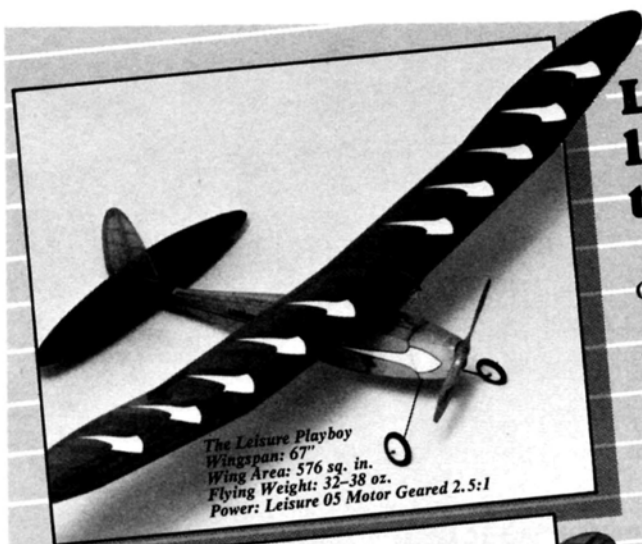
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HOVERING

(Continued from page 84)

The Walk Around. This technique begins with the helicopter in a normal hover position. Keeping the helicopter in place over the ground, you start to walk around one side, eventually coming to the nose. The advantage of this technique is that you start from the normal hover position without training gear, and you slowly move around the helicopter at your own pace. Another advantage is that you're looking at the helicopter from every possible angle as you walk around, rather than just the nose or tail as in the other techniques.

The big disadvantage of this technique is that you have to pass the beam or side view as you progress to the nose. This can be a rather trying experience because at times it is very difficult (depending on your helicopter and the lighting conditions) to tell if the helicopter is banking into or away from you. To help out in this situation, I paint the outside of my skids white. Then when I see the white skid low (in respect to the other skid), I know the helicopter is banking into me, and vice versa. But it takes practice. Another disadvantage is that just as soon as you begin to feel comfortable looking at the

side, you have to progress to the front quarter view. This puts you in a position where you're still looking at the side but also the nose, and the controls just start to reverse.

To practice this technique, bring the helicopter into your normal hover position, standing behind it and to one side. The altitude you use to practice depends on your personal preference, a 5 foot height is good to see any helicopter movement, but a 10 foot height will give you more time to recover if needed.

You should already feel comfortable looking at the helicopter from the rear quarter on either side, so pick a direction and start to walk around slowly to the side view. Stop before you get to the side view and practice in that position until you feel comfortable. You may then want to walk back toward the rear and walk around from the other direction, again stopping just short of the side view. You may also like to fly the helicopter from one side better than the other, but that's something you'll need to overcome because the helicopter doesn't know, or care, where you're standing; it flies the same from any angle.

Progress to the full side view, the front quarter, and eventually the nose. This



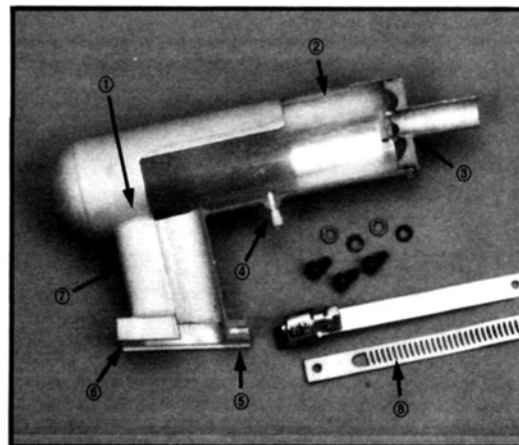
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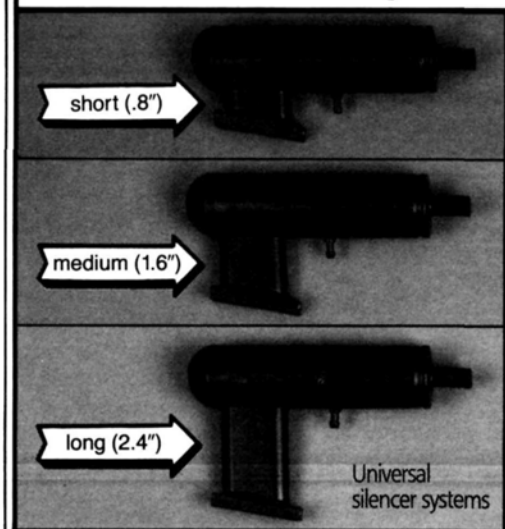
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technique may take the longest time to master and may be harder (at least initially) than the others, but it produces the best results. When you're finished, you'll feel comfortable looking at the helicopter from any angle.

Normally I recommend that hover practice should be done into a light, steady wind. This enables the vertical tail fin to keep the nose straight into the wind. However, a spin-off on this technique on a calm day would be to keep your normal hover position and slowly turn the helicopter around using tail rotor. This brings more tail rotor coordination into your training and, therefore, takes away some concentration from the right stick—but it might be something you'll want to try.

As you're practicing, always keep in mind which way you need to bank and turn the nose to get the helicopter away from you should you become disoriented. It's very important to have this fixed in your mind *before* it's necessary, because when disoriented, it's very easy to put in the wrong controls.

More Advanced Maneuvers. Once you feel comfortable looking at the nose in a hover, it's time to start moving the helicopter around a bit to get the feel of changing directions and altitude. One

good way to practice is to hover to the right about 10 feet, then bring it back to you. Remember, whatever you do to the right, you must also do to the left; this will prevent you from developing any bad habits.

As you move the helicopter right and left, start coordinating the tail rotor; soon you'll be doing figure 8s in front of you while looking at the nose. Once these side-to-side movements feel comfortable, try backing the helicopter away from you, then climbing as you back away.

With a little practice, it won't be long until you can fly comfortably looking at the helicopter from any angle. This will open the door for progress to autorotations and other advanced maneuvers because the helicopter will feel comfortable no matter what position it's in. ■

R/C NEWS

(Continued from page 58)

positive PR moves, the show teams. Those groups have grabbed the interest of thousands of nonmodelers and have developed an understanding of our activity.

Many clubs pay their dues by organ-

(Continued on page 88)

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R/C NEWS

(Continued from page 87)

izing other kinds of shows that display our modeling talents. Those best known include New York, Toledo, Washington state and California. But dozens of clubs present mini-Toledos and they're doing a lot of good for all modelers. One such club is the Fairfield League of Yankee Radio Controllers (FLYRC). This club has organized their Wings of Spring for some years in a hangar at Danbury, Connecticut, Airport. Wings of Spring is

a static show with prizes in various modeling categories, display of video tapes, helicopter demos, a few commercial booths and a big welcome for all who come. A small admission or registration charge supports the awards given to those showing their latest modeling achievements.

There were forty-plus modelers exhibiting from a four- or five-state area competing in the static event with several hundred visitors on hand to view the displays. Not very big one might say, but

with results that may go a long way to raising R/C's status with an uninformed public. The show garnered a very nice feature story in a local newspaper. It all leads to potential flying fields and support to hold on to existing fields. If every American club ran a show similar to the FLYRC affair, we could no longer have a "secret" hobby.

Congratulations to Reed Kalisher, Dick Purdy, and all the members of the FLYRC group. And congratulations to Best of Show winner, Chauncy Dance with his fine rendition of a Bucker Jungmeister.

Steed Stuff

I visited Doss Steed recently, in his new home in Matthews, North Carolina. You may remember past discussions about Doss' modeling—he is one of the best scale modelers in the U.S. Unfortunately, Doss (like so many fine modelers) chooses not to compete. And that's okay, competition is not for everyone. The problem is that most of us are excluded from seeing and learning about some great projects and some novel building techniques since the Doss Steeds of this world do not get

(Continued on page 90)

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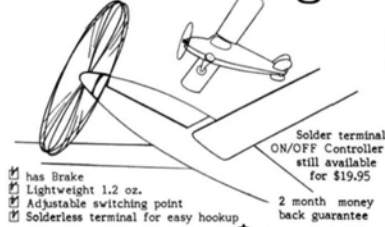
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R/C NEWS

(Continued from page 88)

the publicity that results from contest flying. But, make no mistake, Doss and a number of others around this country are indeed top-notch scalers.

All by way of telling you about my visit. Doss has built a fine workshop in his new garage, replete with virtually every power tool you can think of. Just outside is a small prefab building that serves as a near-perfect spray room. I've walked into Doss' shop many times when he lived in New Jersey and I've always been impressed. This visit nearly blew my mind, for sitting on Steed's huge workbench were two 1/4-scale BT-13 Vultee Vanguard. For most modelers, one of these behemoths would be more than enough—not here!

The BT-13 is true 1/4-scale with a wingspan of 126 inches and a length of 81 1/2 inches. Design weight is between 35 and 40 pounds for a Sachs 4.2 (CDI) and 24x12 props. Right now both airframes are complete and the finishing process is well underway.

The finish for the birds is a bit unusual. Doss first covered the airplane with lightweight Ceconite and then with Chrome MonoKote. Apparently the Ceconite elim-

inates any bubbling of the MonoKote and the plastic covering clings tenaciously to the fabric.

The real tip is the way Doss burnishes the MonoKote before application. He first cuts the material to appropriate size to duplicate a given panel. He then burnishes the Chrome MonoKote on a piece of glass that is kept scrupulously clean with a tack cloth. He does the burnishing with 600 finishing paper, although fine steel wool does well. All rubbing is done in one direction. I can tell you that the results are as close to real aluminum as I've ever seen.

The way to learn the technique is to apply a piece of Ceconite to a slab of balsa—say, 3x12x1/4 inches. Then try various applications of burnished Chrome MonoKote to this test piece. I think you'll like the results.

It's off to Byron Originals' big show in Ida Grove; a lot on that next month. Keep 'em flying!

Art Schroeder, c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897. ■

FOX 40BBRC

(Continued from page 45)

flanked by two fairly large bypass ports, with a shallow but very wide third port diametrically opposite. They are timed for opening periods of, respectively, 146 degrees, 112 degrees and 108 degrees of crank angle.

Like the Series 5, the Series 6 uses a two-component cylinder head. However, the "head button" (combustion chamber insert) is shallower, with a slightly sloped, rather than flat, squishband and, as a result, the extremely high compression-ratio formerly used is reduced to a much more modest level, presumably in the interests of easier handling and smoother running. As before, the two-needle adjustable automatic mixture control carburetor is retained in the intake boss with a single setscrew and is sealed with epoxy.

The 40BBRC comes complete with a Fox "Tilt-Down" muffler. This has a volume of 42 ml and an outlet nozzle area of 65 sq mm. which should give a tolerably decent balance of noise suppression against power loss.

Peter Chinn, c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897. ■

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FROM COCKPIT

(Continued from page 69)

more than simply another restoration job to Rielley. Although he had yet to install the top turret, that was about the only bit of original hardware missing. A tour of the airplane was a trip to 1944. Everything was right. Even the chromate-tinged air inside the fuselage had a vaguely nostalgic smell to it.

And then there was Kermit Week's P-51D, Cripes A'mighty. What Rielley had done for B-17s, Week's did in spades for the Mustangs. This is not another of your stand-off scale restorations. This is the real thing. This is the way they really looked, albeit a lot shinier. Pop open a gun bay and you find a Browning .50 with rays of honest-to-God .50 calibers linked up and ready to go. Hang your head down inside the cockpit and the armor plate with its little head pad grabs your eye. To a real Mustang freak, a quick glance at

the panel would make them immediately think a mistake had been made. Rather than the K-14A computing gunsight usually found on D-model Mustangs, the older Bell and Howell optical sight, which was used in the older B and C Mustangs, was mounted. However, a short conversation with Weeks will produce a photograph that shows the airplane had that sight mounted when it carried this particular paint scheme. The airplane is an absolute hundred-point award winner both in its authenticity and its detailing. In fact, its perfect detailing may be the only nonauthentic thing about it.

One distinctly different aspect of TICO is that there seems to be more unusual types there than at other shows like Oshkosh, and there will be airplanes there seen almost no place else. How often, for instance, does a hulking PV-2 Harpoon darken your doorway? And it's not often that a long line of C-45 twin Beeches (all

of them in varying degree of military paint and restoration) has a Lockheed 12A as an exclamation point, making it possible to accurately compare the two airplanes which are often mistaken for each other.

At one time there were six B-25s parked wing tip to wing tip, but it was the gigantic outline of the HU-16 Albatross that towered above all. Restored by Dennis Buehn of Reno, Nevada, this was one of the few West Coasters to make the long trek to Florida. It was also the first time that many in the crowd had ever been next to an amphibian on the ramp so this was their first chance to get a feeling for how tall they really are.

The show at TICO is really nothing more than the airplanes themselves. There is little of the glitzy smoking-biplane aerobatic flavor to it. In fact, that again is one of the unique characteristics of TICO. It tries to show the crowd where the military airplane came from and what it contributed to the defense of the country. Grouped into Pearl Harbor to D/VJ Day categories, the fake Zeros and Messerschmitts attack, and the Mustangs and Corsairs defend. Amid furious pyrotechnic explosions, the crowd learns how the war was fought from ground and sea and what each type of airplane contributed.

When this type of nostalgic format was first presented by the Confederate Air Force in their annual shows in Texas, the show started and stopped with WW II. These days, however, we're finding it important to remember so many other battles that date much later than 1945.

(Continued on page 94)

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the gentle *tink, tink* of Pratt and Whitneys cooling off was clearly audible. The smell was of hot exhaust stacks, hydraulic oil and that totally identifiable warbird smell that mixes some sort of Bakelite odor with high octane and hydraulics. The evening was so heavy with nostalgia, it could almost be wrung out of the air like dew.

Suddenly, with absolutely no warning, an unbelievably bright point of light leapt out of the tree line. It climbed nearly vertically with little or no arch, leaving a trail of smoke so dense, it didn't dissipate as the light climbed higher. With my hand resting on the 45-year-old cowl of an aging warrior, I witnessed my first satellite launch. That was a ComStar headed into a stationary orbit! Now I knew how middle-aged Indian warriors must have felt when they saw an airplane for the first time. They were seeing history being compacted before their very eyes. So were we, the gang standing on the ramp at Titusville.

That kind of situation exists at only one place: Titusville, Florida, in March. It's a great show, an unparalleled documentation opportunity, and it's warm to boot. ■

FROM COCKPIT

(Continued from page 92)

This year the Panthers represented that long-term Police Action which has almost been overshadowed by media wards on either side of it. If it weren't for Alan Alda and his lunatic sidekicks, Korea would be remembered as just another place cheap electronics come from. A flight of Phantoms brought us up to date and the vets in the crowd watching them streak past had little or no gray in

their hair. The Phantoms were part of this generation's war.

The TICO show is in an interesting geographical place, especially if you like to see historical eras sandwiched back to back. The airport is only a few hundred yards from the inland waterway that separates Cape Kennedy from the mainland. A few years back, I was standing on the ramp in the dying twilight after an air-to-air mission and the compactness of history came right up and hit most of us in the nose. The air was so calm and quiet,

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PETT ROBIN

(Continued from page 61)

one axis (control) per stick. This is likely to be bothersome for a newcomer, who probably shouldn't be trying Robin anyway. A four-channel (or better) radio allows you to have the elevator and ailerons on one stick (the R.H.), just like standard Mode II flying. The difference in cost between a two- and four-channel system is not that great and you're likely to get lots more use from the four-channel.

After a break-in run was performed

(following the instructions) with the prop and spinner removed, I recharged the battery and headed for the flying field. No specific control surface throws were provided, so I set up $\frac{3}{16}$ inch for everything. This was a good starting point but eventually added a bit to the ailerons and softened the elevator. All of this is easily accomplished with dual-rate radios.

Nick Zirola flew the Robin for photographs and I advised him that the break-in run yielded about 8½ minutes. Neither of us considered this an unloaded state so 2 minutes, 57 seconds later when the motor quit, we were a bit surprised!

After recharging, we again hand-launched the airplane (ROG is almost impossible due to no rudder or steerable tailwheel) and started sorting things out. The trims were good, the airplane stable and brisk: not a fireball, but certainly not a floater. About two minutes into the flight a gremlin grabbed the radio, half-rolled the Robin, put the nose down and smacko, hit the ground! The radio was still playing fine, so we ran the motor down and recharged.

We have flown the Robin a lot, and the flights run consistently around the 3-minute mark. It's a fun flyer but I noticed a couple of things that require some getting used to, especially for those of us who normally fly glow. The no-throttle means that you're committed to flight after launch—there ain't no turning back. Another thing is the lack of audible cues that one becomes accustomed to hearing—you don't hear the rpm pick up as you come downhill, building speed. Welcome to the silent world of electrics, where prop noise is all you hear, and not much of that.

The Robin, like its high-wing Citabria-styled sister, the Dreamin 850, and motor glider Breezin 1200, is a unique entry into the ARF world. These planes require very little maintenance but need a little love. They're neat, durable, take 'em with you, fly 'em at lunch machines, which will very likely endear themselves to you in short order. To you guys not yet "electrified," I'll bet you could create a real firecracker by planting a new O.S. .10 FP in the nose....

I can't really recommend the Robin to the novice since, like most other small airplanes, it requires attention while you fly it. The intermediate flier, however, will probably find it a delightful change of pace.

This little bird truly is a little hummer!

*The following is the address of the company mentioned in this article:

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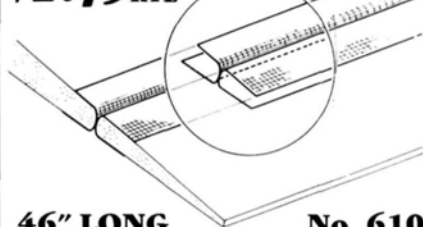


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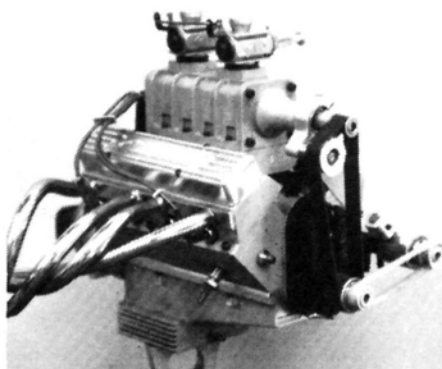
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O.S. FS-120S

(Continued from page 43)

pushrod-OHV engine with a transverse camshaft at the front driven from the crankshaft through crossed helical gears. But it has numerous refinements and modifications aimed at substantially increasing performance, reliability, and durability.

The most obvious change is the addition of a fuel pump built into the back of the crankcase. The pump is of the gear type (similar to an automotive oil pump) and is driven by the crankpin. It also incorporates a diaphragm-type pressure regulator. This means that fuel is delivered to the carburetor at the rate required to maintain optimum mixture strength, irrespective of aircraft attitude or fuel tank location, so that the engine runs steadily under all conditions. Because fuel is delivered to the carburetor jet under positive pressure and does not depend on suction created within the carb venturi, a much larger venturi size can be used to liberate more power. In the case of the special Type C-12 carburetor fitted to the FS-120S, the effective choke area is of the order of 56 sq mm.

Port areas and valve sizes are of appropriately enlarged dimensions. For example, the inlet pipe has an internal diameter of 11.5 mm, compared with 8.5 mm for the old model, and the inlet port in the cylinder head is enlarged from 8.5 mm to 10 mm. The inlet valve, larger than the exhaust valve, in accordance with accepted full-size practice, is 14.2 mm diameter, compared with 12.1 mm for the FS-120. Unlike its predecessor, which had inclined valves in a shallow bathtub-shaped combustion chamber like other recent O.S. four-cycle motors.

Looking at the photos of the FS-120S, it will be observed that there is a tube

connecting a nipple on the crankcase to a small diameter pipe in the inlet pipe just above the carburetor. At first, one might suppose that the purpose of this was to draw the blowby gases from the crankcase and return them to the induction system, as occurs in a PCV system forming part of an automotive emission control package. In fact, its function is to agitate the fuel/air mixture in the inlet pipe and accelerate atomization of the charge entering the cylinder in order to achieve more efficient combustion and the device is the subject of a patent application.

The FS-120S is supplied complete with a firmly fitting header pipe and a machined-aluminum, expansion chamber-type muffler, plus the usual tools and accessories that accompany an O.S. four-cycle engine. Optional extras include

flexible exhaust pipes in a choice of two lengths, a spinner nut, and a sturdy aluminum radial mount for use where firewall mounting is preferred.

The FS-120 "Surpass" has a more squat appearance than its predecessor, although its overall height is actually the same, as is its crankcase width and mounting hole spacing. However, owners wishing to re-engine an existing FS-120 powered aircraft, should note that the FS-120S is about 1/4-inch longer than the old model, including approximately one-tenth of an inch extra overhang from the cylinder axis to the prop driver face. At 33.3 oz, including muffler, it is just under 5 ounces heavier than the original engine and muffler combination.

Peter Chinn, c/o Model Airplane News, 632 Danbury Rd., Wilton, CT 06897. ■

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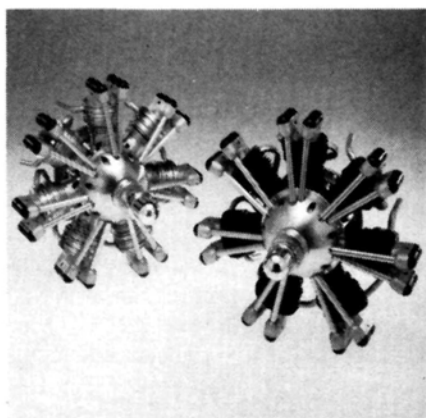
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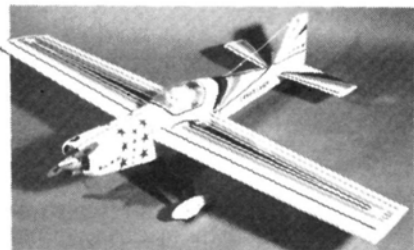


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Product News



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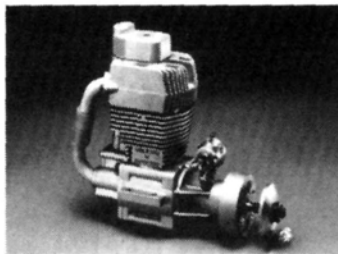
This all-new addition to the Lanier A.R.F. line features a pre-finished fuselage of vacu-formed ABS with installed plywood crutches and pre-covered Aerosheet wing with installed spars. Tail surfaces are pre-cut and covered with Aeroskin. Specs: wingspan—63 inches; area—630 square inches; weight—6 pounds; channels—4. For more information contact Lanier R/C (P.O. Box 458, Oakwood Rd., Oakwood, GA 30566).



FROM GREAT PLANES

Kyosho's new Breezin 1200 is a 47-inch span electric glider. The Breezin is an almost-ready-to-fly motor glider with pre-built, pre-covered balsa wings and blow-molded fuselage. With the kit-supplied RS-380S motor and matching propeller, the Breezin flies gently and easily. Also included in the kit is a 6-volt, 450 mAh battery pack and quick-charger. The Breezin comes with a specially designed circuit that shuts off the motor while still allowing radio control should there be a sudden power decrease.

Also new from Great Planes is the SuperTigre S-3000 4T, a new 1.8-cubic-inch single-cylinder four-stroke engine. The S-3000 4T is the largest single-cylinder four-stroke available and will delight scale fans who up until now could only get this type of four-



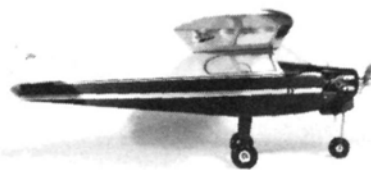
cycle power from a twin-cylinder engine. The S-3000 4T generates 2.45 horsepower at 8,500 rpm yet weighs only 3 pounds.

For more information about these products contact Great Planes Model Distributors (P.O. Box 4021, Champaign, IL 61820).



THE BLACK HEADS

Circus Hobbies (3132 South Highland Dr., Las Vegas, NV 89109) introduces the newest high-performance release for the expert helicopter flier. In recognition of the demands of skilled and expert helicopter fliers for more precise control performance, Kalt has developed the new Black 10S and Black 10FS rotor heads. The Black 10S (see-saw) is perfect for the "hot dog" flier who requires total precision while performing aerobatics. The Black 10FS (flapping/see-saw) is perfectly suited for FAI competitions with its extremely smooth, precise hovering abilities. The Black 10FS offers adjustable dampening for each rotor blade, allowing for infinite fine-tuning of the rotor system to match your every demand.



THE AERO-PACER

Aerodrome Models, Ltd. (2623 S. Miller Rd., Saginaw, MI 48603) announces a great sport flyer that qualifies as a trainer. The Aero-Pacer features a 64½-inch wingspan; wing loading of 19 to 25 ounces; and a weight of 5.5 to 7 pounds. Engine size ranges from .45 to .90 four-stroke. For the beginner, a video construction tape is available. For the sport flier, the Aero-Pacer is easily converted to a tail-dragger, complete with flaps. The dihedral is also adjustable. The Aero-Pacer with a Saito 65 is really something else on floats for the water enthusiast. Aerodrome kits are hand-cut from select balsa and ply and are designed primarily for four-stroke engines but can be easily converted for two-strokes.



SEVEN-SEC SERVO

Byron Originals (P.O. Box 279, Ida Grove, IA 51445) introduces a true 180° seven-second servo. This new heavy-duty servo (100 ounce/inches torque) made its debut with the release of the Seawind ¼-scale amphibian home-built. The full seven-second rotation teams up with the Byron dual spool air valve to provide ample time for scale sequencing of both retracts and gear doors. Excellent for scale flap operation, the seven-second servo is completely over center at full flap, eliminating battery drain. The servo comes available with either Deans connector, Kraft connector, Futaba Standard (A.M.) connector or Less connector and comes complete with offset arm.

Descriptions of new products appearing in these pages were derived from press releases by the manufacturers and/or their advertising agencies. The information given here does not constitute endorsement by **Model Airplane News**, or guarantee of performance by **Model Airplane News**. When writing to the manufacturer about any product described here, be sure to mention that you read about it in **Model Airplane News**.



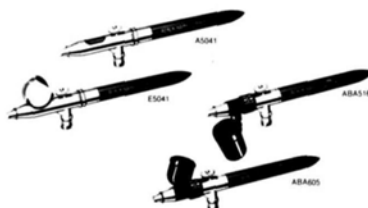
E-POX-E SYSTEMS

Loctite Corporation (4450 Cranwood Court, Cleveland, OH 44128) introduces not just another epoxy. Their new E-Pox-E systems have been formulated for both the hobby and craft market. This isn't just hardware store epoxy repackaged for the modeler. This epoxy gives a working time of approximately 5 minutes and cures crystal clear.



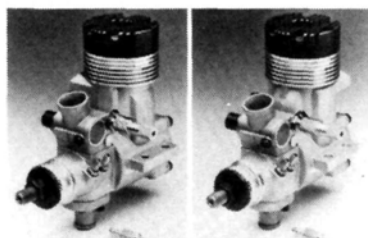
LIGHTER PACKS

Leisure Electronics (22971 Triton Way, Unit B, Laguna Hills, CA 92653) has brought out new 800 MA battery packs. These packs are lighter than the traditional 1200 MA packs, which were previously included in Leisure flight systems. In tests with the new 800 MA battery packs, Leisure found that their 05 motors ran faster with less voltage drop over the total running time. A slight loss in running time with the lower capacity batteries is more than compensated for by the savings in weight (5 ounces), so critical in electric flight. The 800 MA battery packs are now pre-packaged with Leisure 05 motors and switch assemblies as complete flight power systems.



DELUXE BRUSHES

Koh-I-Noor Radiographic, Inc. (100 North St., P.O. Box 68, Bloomsbury, NJ 08804) has announced an agreement with The DeVilbiss Co., Ltd. of Bournemouth, England, for exclusive Koh-I-Noor distributorship in the U.S. of the complete DeVilbiss line of Aerograph airbrushes. The deluxe brush in the DeVilbiss line is the Aerograph 63A model, which can produce a hairline of color for delicate and fine-line work. The E model offers a large color cup capacity to cover greater area while providing absolute continuity of color. Other models include the gravity-fed Aerograph Sprite, and the suction-fed Aerograph Sprite Major. All four models are dual-action airbrushes.



FROM FUTABA

Futaba Corporation of America (555 W. Victoria St., Compton, CA 90220) has recently introduced the YS/Futaba 60F.S-H (side exhaust) and YS/Futaba 60F.R-H (rear exhaust) engines. The YS/Futaba 60F-H helicopter engine is a virtually hand-built version of YS/Futaba's legendary aircraft 60s. Features include superior material and machining quality and YS/Futaba's unique variable pressurization system. Coupled to the YS integrated carburetor design, fuel flow is continuously and automatically regulated. The YS/Futaba 60F-H incorporates a ringed piston for easy starting and cooler running in helicopter installations.



NEW FROM PIC

Penn International Chemicals (943 Stierlin Rd., Mt. View, CA 94043) has recently introduced a new type of fiberglass cloth. The new product is "woven" fiberglass, which offers excellent bi-directional strength due to its woven strands of fiber. This is the first such cloth offered to the industry that is "silane treated," rather than the more common "volan-type." Silane cloth offers superior hand-formability and rapid adhesive wetting (these qualities won't deteriorate with silane-treated cloth systems). The cloth is sold as folded packs in pieces 36x38 inches. Four weights are offered: 3/4 ounce, 6 ounce (fine weave), and 6 ounce (narrow weave). You'll find this new product at leading hobby shops.



Also new from PIC is "PIC Poxy," the only 60-minute pot life epoxy offered to the hobbyist. The greater mixing time (that is, the longer period of time before gelation begins) gives this A + B epoxy system the advantage of being a liquid longer at the bond interface and maximized wetting of members being joined. PIC ratings are: pot life—60 minutes; handling time—12 hours; full cure—24 hours. This product is also available right now at leading hobby shops.

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GOLDEN AGE

(Continued from page 55)

Gabeaux of Belgium and was respectable, giving him 4,977 points. What followed, led to some apprehension. Bickel of Switzerland and then Gast of Germany took off and almost immediately crashed apparently due to radio problems. With deBolt scheduled next, it was a sweaty situation!

The deBolt Stitts lifted off neatly and entered the aerobatic pattern. About one-third into the schedule came the tail slide. The Stitts went vertical nicely, stopped and dropped back ideally. A 10-pointer, except that the recovery was a straight dive into the concrete without control! With three radio failures in a row, the meet came to a halt while an investigation was made. We did get the score sheet and were surprised to see straight 9s and 10s for the one-third flight, a total of 2,702 points!

The investigation found no apparent problem, so the next man, Corghi of Italy, flew without incident or a very good score. We later found a broken battery wire in what was left of the Stitts. You wired your own dry cells together in those days!

The meet moved along smoothly with Van Den Bergh of England flying well for 5,082-point score. Stegmeir of Germany topped that with 5,233 points, his vacuum system working fine. Then it was Kazmirski's turn; big Ed was really keyed up! What can be said? Right from the takeoff, Ed was pulsing those levers. Everything seemed great until he entered the three inside loops. At the top of the first loop his engine suddenly seemed to quit but fortunately came back on as he went over the top. What a scare! The rest of the flight went without incident and the score sheet showed 6,273 points, putting his first flight well out in front.

Bob got off well, but it was obvious on the first circuit that he had a problem—his engine was dead rich! Being the pilot that he was, he struggled through the maneuvers to near the end, when the rich engine simply drained the tank. Even so, his score was a respectable 4,923 points.

Before the first round was over, the highly respected American team was in real trouble, and fate was not finished yet! During the first round, while the Americans were struggling, the British and German teams were methodically posting scores in the crowded 5,000-point range. At the end of the first round it was obvious that the team championship would be a hard-fought battle. Should Kazmirski falter, Van Den Bergh of

England plus Stegmier and Samman of Germany were within striking distance for the individual championship. At this point nothing was for sure!

With overnight to prepare for the second round, our team gave the models a thorough 100-hour check. Everything seemed in order. Dunham desperately wanted an engine-check flight, but there just was no place to do it.

The second day would be beautiful flying weather. The round started with Bickel of Switzerland posting a mediocre score. In this round Kaz would be the first American to fly, and he did so with an almost duplicate of his first, including the antagonizing engine glitches in the loops! The score was an outstanding 6,185 points.

Van Den Bergh flew next in a most inspired way, but his 5,900 points wouldn't be enough. Later, both Stegmier and Sammon of Germany improved their scores by several hundred points, but the rest of the meet would be anticlimatic as far as the World Champion was concerned.

Considerable interest was shown in deBolt's biplane, the question being how a competitive a biplane could be. With our team's hopes hanging on the flight, the anxiety was high. It quickly disappeared with a successful takeoff, and the flight proved routine for the old standby model. The 5,700-point score would prove to be third highest in the Championship and enough for a final seventh place. The biplane was competitive!

Our team was excited, in spite of what fate had dealt. Big Ed had the World

Championship and we were in strong contention for team honors as well. Bob was nearly last to fly, so you can bet all eyes were on him. After nearly two years of concentrated effort, the American potential boiled down to one last attempt by our National Champion.

Bob went to the flight line with determination. The engine started quickly and after a double-check of the setting an excellent takeoff was made. In a cautious wide circle to enter the pattern, the engine seemed to be purring like a kitten. Then, as the first maneuver was commenced, the engine cut cold. The silence was so complete! In a moment fate had sealed the outcome of the first World Championship.

The first FAI R/C World Champion was Edward Kazmirski of the U.S. Closely contested team honors went to England with Germany in second place followed by the U.S.

The contest moved along so well that the last flight was completed early in the afternoon. This left the Swiss with a problem: some 5,000 paid spectators and no activity! So they asked the contestants for help. Would we demonstrate? About a dozen flyers volunteered and the exhibition began. Naturally the Champion flew first and the crowd responded in grand style to his usual fine routine. Several others followed exemplifying just how well big Ed had flown. The next American was deBolt with a conservative barn-stormer biplane flight which ended with some neat vertical rolls, something which was just not seen in Europe! Dunham was anxious to fly, of course, having done so little in the meet. Would you believe the K&B ran like a charm, allowing Bob to demonstrate just how great the Volts-wagon really was? You should have heard the crowd when he flew the length

(Continued on page 105)



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GOLDEN AGE

(Continued from page 103)

of the area only 3 feet off the deck, inverted! While the flying did not win Bob a thing, it was a great satisfaction to be able to show his potential.

There also was some model-trading—we all got to trade with one of the Europeans and fly. Stegmier was intrigued by my biplane and flew it for a while. His translated comment was that the controls were awfully quick and he like the stability. I could understand when I flew his vacuum system. The stick response was like a sponge, mushy with large movements required for any action. You really had to anticipate any control needs. To me, the flight felt like free flight, so I was scared to try stunts with it. Our conclusion was that their equipment was so different it would take much time to evaluate, but ours seemed more positive in all respects.

The Swiss closed the Championship in fine style with an outstanding Awards Banquet. Specially cast bronze cow bells were given as awards, a Swiss tradition. Ed's was so big and heavy that he could hardly lift it! The trip back to the hotel could have been a disaster. One of the Swiss officials had a small car, and too many people piled into it. There was a curve in the road to the hotel and as that top-heavy little car rounded the curve, it flipped upside down and slid along on its top. And would you believe that no one got more than a minor bruise?

The last of the unexpected came as a result of the exhibition flying. Some of the leading Germans in attendance could hardly believe the flying our American team had demonstrated. Led by Johannes Graupner, we were invited to exhibition-fly in Germany. What began as a single invitation exploded into numerous engagements which would keep the team in Germany for more than a month! Several days at the German Nationals would ensue. An adventure.

The team's German Adventure is another R/C episode. We do hope that the stage we have set with the first World Champs has shown you the state of the art as proportional was about to be born.

Hal "Pappy" deBolt, c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897. ■



CAN. FUN-FLY

(Continued from page 29)

The Saturday evening chicken fest was hosted by the club at their local field. I've never seen such hospitality or selection of desserts! Everyone who showed up enjoyed themselves and some of us, including Frank Finelli, sure got their five bucks' worth.

Monopolizing a large chunk of the pit area was the miniature Air Force of Dr. Jack Tse of Mississauga, Ontario. Those of you who read last year's coverage will not be surprised to hear that Jack showed up this year with no less than a dozen airplanes; among them, three SR-71s, two F/A-18s, three brand-spanking-new (love 'em, gotta have one) F-15s, and the absolute show-stoppin', heart-throbbin', eye-waterin' *piece de resistance*—a matched pair of wing-swingin' 1/10-scale F-14 Tomcats. The wing swing mechanics in the Tomcat are works of art and involve precision-machined parts. Jack's band of merry men—all experts in a discipline—designed, built, and flew this armada. New molds are in the works to produce a slightly larger (1/6-scale) version which Jack feels will work better and

reduce the wing loading substantially. The present version is a very brisk performer and is certainly impressive when airborne. One was lost in a crash that appeared to be a result of elevator-blanking during a sharp high-G turn. The number two ship will likely be used for further testing. Jack has a lot of things in the works for the future, possibly including kit production of his designs plus the availability of a Ready-to-Fly F-14 complete with PCM Multiplex radio. If this project reaches fruition it will undoubtedly represent the ultimate in ready-to-fly machinery. Jack, as you might have guessed, takes this ducted-fan stuff seriously. His airplanes alone accounted for the use of 23 Dynamax fans plus a number of O.S. 77s and Rossies!

This event is apparently considered by the fan and kit manufacturers to be important enough to attend and demonstrate their products, so among the returnees from last year were Tom Cook of Jet Model Products with his Starfire B, a whole new version of his popular sport jet. Tom is getting it sorted out with a limited number of pre-production units

(Continued on page 108)

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CAN. FUN-FLY

(Continued from page 105)

"on the street." One of these is being flown by Dennis Crooks, who does a superb job in both flying and finishing. The Starfires were, quite naturally, powered by Tom's fan unit, the Dynamax using the O.S. 77.

Byron Originals was represented by the Skyriders show team of Washington, flying Byron F-16s. Sponsored by PIC, the team consists of Ronnie Kemp, Karl Hibbs, and Terry Malcolm, who have already started traveling to the major ducted-fan gatherings. This was my first opportunity to see the new Byron Bullet fly, which, as I mentioned in last month's "Jet Blast," is a rather rapid airplane. I still hope it will receive cosmetic attention but there's no denying that it is fast and maneuverable.

Bob Violett was on hand with a gaggle of Sport Sharks, Aggressors, and Vipers. Daughter Patti once again entertained the troops with her silky smooth guidance of an Aggressor. This series of airplanes is probably the slipperiest out there. The Viper is really swoopy, but the Aggressor still remains my favorite of the bunch; and it was the only machine on hand which repeatedly executed intentional snap rolls—a unique maneuver for a jet!

Kerry Sterner and Jim Werst brought their F-80 and new Sport Fan, which uses a Byro-Jet, flies really well and will take a lot of throwing around. It's uncomplicated and should find favor with sport jet fliers.

Canadian native Bob Parkinson flew his Regal Eagle around routinely throughout the rally. This all-wood kit uses the Byro-Jet and is relatively quick to build. It occurs to me that it's a natural for conversion to a Mig-25 Foxbat (Foxfan? Fanbat?). After all, the Regal Eagle needs an adversary. Bob also had his Avro CF-105 Arrow buzzing around the patch. This is the MKII version, which, like the Eagle, is mostly balsa.

Having all these manufacturers available to answer questions, solve problems, trim airplanes, and just help out is something unique to the fan fraternity. What other segment of R/C can make the same claim? I, for one, am glad of it, because it's just one more method of removing the "shroud of mystery" surrounding ducted fans.

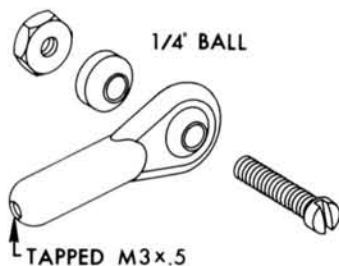
Kudos were given to the Bay of Quinte group and especially the event director, Joe LeBoutier, for an enjoyable, fun-filled weekend. Plaques for all participants were presented at the conclusion of the activities, in addition to Loctite Hobby

(Continued on page 110)

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CAN. FUN-FLY

(Continued from page 108)

Products provided by Chris Abate of Loctite Corporation. Everyone went away with something: kits, plaques, materials, fan units, information, and, for some of us, sunburn.

Although plans have not been formalized for next year, a whole bunch of us are looking forward to it. Plan to attend.

Rich Uravitch, c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897. ■

PRONTO

(Continued from page 74)

because all three are different in height and are easily identified by matching them to the fuse side-view. The instructions also help to avoid slip-ups, so read them, please. Since the Electric Pronto is a modified Pronto kit, the plans show the 48-inch wing. You'll find a plan extension with two added wing bays. Simply tape this on and build the wing. No problems should be encountered due to the fact that the wing is a constant-chord extension of the original. With the help of Pacer's* Zap Ca+ and Zip Kicker, the model was

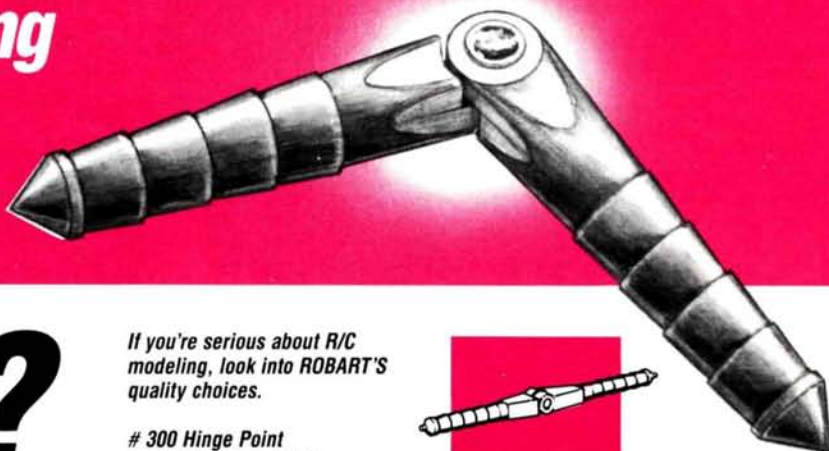
ready for covering in three very leisurely building sessions. Covering the model with transparent blue MonoKote took another evening, as did the radio and motor/belt-drive assembly installation. The entire project can realistically be handled in five days. The installation of the Hobby Lobby Super Olympus in the Pronto is probably easier than with other electrics because it mounts right onto the engine mounts via a plywood plate, however, the option of a cobalt motor will require no great modification. The power is transferred from the batteries to the motor via the 1½-ounce Hobby Lobby "Miniblit" speed controller.

The fuselage, as aforementioned, has a very appealing tailored-look to it because of the sleek, long fuse/tail moment and the pre-shaped nose hatch/cowl and headrest. As far as the fuse construction goes, mark all former locations per the instructions, tack-glue the first few crucial steps, and check to see that the fuse is not twisted or skewed. If it is twisted, breaking the tack joints is easy. Don't worry, this fuselage is by no means a problem but the rest of the construction is so utterly simple I thought this step should be too.

The wing is built directly over the plans

(Continued on page 112)

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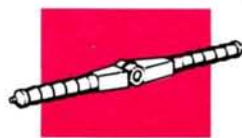
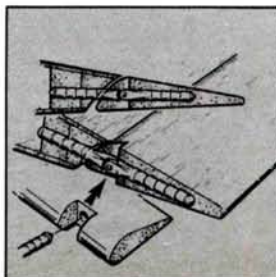
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PRONTO

(Continued from page 110)

on a flat surface with both right and left panels being shown. If you wish to add a little wash-out in the wing tips you can block up the tips $\frac{3}{16}$ to $\frac{1}{4}$ inch, or you can apply heat with a heat gun to the Mono-Koted wing and twist it. This isn't required but does help to diminish the ballooning tendency of a flat-bottom wing. If you're a rank beginner, I'd leave the wing as it is to retain all the floating qualities you can.

FLYING. With 2½-inch wheels and a good 8.4-volt battery pack, the Electric Pronto will ROG off pavement or cut grass. The higher aspect ratio wing of the Electric Pronto responds to rudder even better than the original version but dihedral is the same. The Electric Pronto is great for scribing figures through the sky and just lazy afternoon relaxing. Maneuvers such as loops can be attained by first entering a shallow dive. With an extremely favorable wing loading of 14.4 ounces per square foot, this model is also great for training a student who prefers a low-wing mode. Because of the healthy wingspan and generous dihedral, wind can get under the wing and make things real bumpy on a gusty day, so I don't recommend flying this design in anything but a moderate breeze. Keep in mind that the features that make this one not suitable for higher winds are the same ones that make the Pronto an extremely forgiving airplane. The seasoned pilot will also find use for this bird. It makes a good travel plane that's able to be hand-launched out of small fields without disturbing anyone. If more performance is desired, as I mentioned earlier, a cobalt could be added. With its light wing loading, an O.S. .20 four-stroke would make yet another interesting combination with the Pronto and would mount directly onto the supplied beam mounts.

The Electric Pronto is a very versatile design for a number of flying modes. All in all, the Electric Pronto is an all around excellent value. Just in—during a recent conversation with Jim Martin of Hobby Lobby, I've learned that the Pronto will be offered in a built and covered ARF version...watch for it in the very near future.

*The following are the addresses of the manufacturers mentioned in this column:

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SMALL STEPS

(Continued from page 36)

Aero Sport radio. Himer No. 2 has made it through two seasons but Himer No. 3 is waiting in the wings just in case!"

Almost all "new designs" are produced by continued modification of "old designs," which they usually surpass. That's what this column is all about, so let's hear about those dandy modifications of yours...such as the one by John Gill of Dallas, Texas. John solved the problem of removable biplane wings, by soldering wheel collars to the fuselage cabane struts and holding the wing in place with setscrews. Marks on the wing cabanes assured identical assembly each time. Slick or what?

Randy Randolph, c/o Model Airplane News, 632 Danbury Rd., Wilton, CT 06897. ■

CHARGER

(Continued from page 52)

end or an indentation or a tab in the case of a cylindrical IC. ICs normally are packaged with a piece of foam protecting their connection leads. The IC should not be removed from this protection until such time as it is ready for use; otherwise, it is extremely difficult to line up the leads for their mating holes in the PC board. In the construction of the Ace H/D 500, resistors, capacitors, transistors, diodes, and an LED are used.

So much for components. Most of the kits that I have worked on, such as many of the fine Ace R/C Products currently available, contain very clear and well-

illustrated instructions. The most important thing to remember is to follow the step-by-step procedure. If you do this, it is quite difficult to interchange parts. If you have a question, put the part aside, make a note to come back and by process of

elimination, you will deduce where that part goes.

I'm not going to go through the step-by-step building procedure of the H/D 500, but I'll say that the instructions are

(Continued on page 116)

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Air Age, Inc., Publisher of American Boat Modeler, is looking for creative and articulate college graduates who would be interested in a magazine career. You would work on a variety of magazines and books, and you must have knowledge of the R/C boat industry. This is a tremendous career opportunity. Editorial experience helpful, but not necessary. Send resume to:

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CHARGER

clear and the illustrations great. I completed all assembly and wiring in an evening, about 3½ to 4 hours. The H/D 500 worked perfectly on the first try and it is one of the most frequently used chargers in my shop. The unit is extremely versatile and can charge anything from a single-cell glowplug starting battery to a twelve 5000-mAh batteries for electric flight. I have also found the unit to be very rugged. A large meter on the front panel accurately monitors the charging current. If you have ever wanted to try a kit, look at the Ace R/C H/D 500 Charger.

**The following is the address of the company mentioned in this article:*

Ace R/C, Inc., Box 511C, Higginsville, MO 64037. ■

SOARING NEWS

(Continued from page 78)

"The next day Howard and I became timers for different teams and had another opportunity to sample in a little more detail the activities of X-country soaring. The contest began at 10 AM and very soon people were launching and testing the lift. The LOFT (League of Flight by Thermal) team included Susie Lipp (LSF Level IV), who appears in one of the photos. The first few people onto the course were back shortly after their start. When the Noon Balloon lifted there were as many as 9 models in the air at once trying to gain enough altitude to make it to the next thermal. It took about three thermals to make the first five miles. The thermal killer corn was affecting the lift to the first checkpoint on the second day as it had done the first. The winner for the day and for the contest was Warren Plohr of the Buckeye Soaring Society, who completed the 43-mile course in a time of under three hours. The Davison, Michigan, team came within two miles of completing the course. Dave Batey's (MTS) performance netted him a Fourth."

Book Review

The Aerodynamic Design of Radio Guided Sailplanes by Fernando Gale (Italy: Self-published, 1987) is not for the casual coffee-table browser. This book is a document of nearly 300 pages published in soft cover and meant to be of use to all who wish to know more about the design of sailplanes, particularly R/C model sailplanes.

The paper quality is excellent, with the heavy-coated stock displaying the con-

tained information in bold, dark and sharp typeface against the pure white background, but you'd better have good eyes, as the typeface is in approximately 4-point font with only the diagrams and formulas (yes, formulas, expressions, calculations and equations) in larger type-script.

A wonderful book, a magnificent book—but limited, I fear, to the most diligent of researchers after truth. This is not a criticism, but a fact. You'll need to have a fair understanding of the calculus for some of the more abstruse passages, while a rather complete knowledge of algebra is required for all except the simplest of text and diagrams.

After we've weeded out many modelers whose interests don't progress much beyond the ARF stage, I'd like to get into the details for you.

The book is organized into 15 chapters: elementary aerodynamics; airfoil, wing, fuselage, empennages (tails); complete sailplane; longitudinal static stability; lateral static stability; maneuverability, tailless; canard; construction; examples and problems; problem solutions; and math and physics refresher. There is a glossary of modeling terms and a 10-page airfoil digest, perhaps the most interesting of all for the nontechnical aeromodeler. This covers profile shapes and descriptions and some basic facts about the airfoil. Unfortunately, perhaps, the coordinates are in the old percentages of chord and upper/lower ordinates, a situation that has changed somewhat with the introduction of the computer-generated airfoils such as the Epplers, Wortmanns and others. All is not lost, however, as this somewhat archaic system works almost as well as the newer one, with the exception that fewer points defining the airfoils are listed. However, one can possibly adapt the older system to the newer one with a simple computer program.

This great work leads the modeler through a maze of data and description, to the end of the aerodynamic tunnel.

Dr. Gale is an aeroengineer, model builder and flier. He also designs model aircraft. He errs on the side of rigor and completeness, so as to leave no mathematical stone unturned, or ambiguity unexplained.

Everyone can have fun with this book, which is printed in both Dr. Gale's native Italian and in English. I must say that you don't have to search for a drawing, a diagram or a mathematical expression

(Continued on page 120)

NAME THE PLANE CONTEST

Can you identify this aircraft?

If so, send your answer to **Model Airplane News**, Name the Plane Contest (state issue in which plane appeared), 632 Danbury Rd., Wilton, CT 06897.



The Curtiss XP-55 Ascender was designed to use the new 2200-hp Pratt and Whitney X-1800 engine. Since the engine was not available when promised, all three XP-55s were modified for the well-proven 1275-hp Allison V-1710 engine. The first flight took place on July 19, 1943, but the plane crashed when it fell into an inverted flat spin after a stall and would not recover. The second XP-55 was flown under restriction, including prohibition of being stalled below 20,000 feet. The third XP-55 had increased wingspan and elevator travel. Flight testing began in April '44. The third XP-55 crashed while doing a slow roll at a military airshow. The second example is preserved at the National Air and Space Museum. The plane's specifications are:

powerplant, V-1710-95 (1275 hp); span, 40 feet, 7 inches; wing area, 209 square feet; gross weight, 7710 pounds; maximum speed, 390 mph at 19,300 feet.



Congratulations to John G. Waites of Castro Valley, California, for correctly identifying the mystery airplane. Other correct entries were received from Byron Trent of Daytona, Florida, and Darwin Evelsize of Mascoutah, Illinois.

The winner will be drawn four weeks following publication from correct answers received by postcard delivered by U.S. Mail and will receive a free one-year subscription to **Model**

Airplane News. If already a subscriber, the winner will receive a free one-year extension of his subscription.

SOARING NEWS

(Continued from page 116)

elsewhere than on the page of its corresponding text. This eliminates the pawing of pages in frustration. It reads through, but you must be prepared to spend some time with Dr. Gale (known as "Ferd") before you can reap the rich rewards available to the person who perseveres in the search of knowledge.

Real gems are to be found in this book. For example, I have always wondered how to design a tailless glider without knowing where to begin or how to proceed. If that's your interest, too, Ferdi will lead the way and make it possible for you—but he expects you to work, on the basis that nothing worthwhile comes easy.

You'll find that this book is going to be an absolutely necessary part of your

library. No respectable aeronautical library will be without it, and no serious researcher can afford to be without it; it enlightens.

One thing I absolutely enjoyed is the outstanding method of placing heavy stars following the equations you'll find vital to understanding, and heavy crosses ahead of those text passages that you absolutely have to read for understanding. A very neat and simple method of calling attention to the meat of the matter.

Did you ever wonder how thick and deep to make a wing spar? Of course you did, and so do we all from time to time. But guesswork generally prevails. Better than that, Ferdi tells you how to calculate the dimensions based on materials you employ and the desired stresses you hope to be able to withstand with your sailplane. I'm a "wing nut" and enjoy reading

about flying wings and tailless designs. Here again, you have to patiently persist as you are led through the thicket, but you will emerge with not only an understanding, but an ability to make those elusive things behave. When Ferdi calls his work "nontechnical," I suspect it is with tongue in cheek.

The book is for sale direct from Dr. Gale, Via Marconi 10, Baveno (NO.) 28042, Italy.

Even if you don't read a word, you ought to have it on your bookshelf to impress those who admire your flying skill and think of you as one of the Wright Brothers. With this book, you won't disappoint them.

Eric Marsden from Horndean, England, sent me a book he edited recently and had published. It is titled *Songs We Sang* and covers the words to

Club of the Month

"Swizzle Stick" combat, Hope Field, Shrikes, Pocono Field, Caesar's Resorts, and noise—all topics of interest to members of our "Club of the Month," the Roxbury Area Model Airplane Club, a large, active club in New Jersey.

Recent events included attendance at a three-day fun-fly at Caesar's Pocono Palace. One event involved simulated attacks on Vinnie Gargiulo's 12-foot battleship. Some attacks were "kamikaze" style and the battleship nearly won. The day was saved by newsletter editor Bill Bueso and his F-15 Eagle!

Apparently a number of Wolff-Pak Shrikes have been distributed throughout the club and they seem embarked on a one-design contest.

Noise is a subject of discussion and experimentation at RAMAC. A noise level standard has been imposed at Pocono field but it hasn't been enforced. Some good results have been obtained by connecting a muffled tuned pipe to a regular engine muffler.

Swizzle Stick combat seems popular at RAMAC. The Swizzle Stick is a near-fuselageless (only a crutch serves the function) airplane that's ultra-simple to build, an ideal combat machine. Crepe paper streamers serve as targets.

RAMAC is a club with a purpose—maximum fun and enjoyment for all members. Our congratulations to Vincent Gargiulo, club prexy, and all RAMAC members. *Model Airplane News* is pleased to award them two free one-year subscriptions to be given by them to deserving members.

Each month *Model Airplane News* will select the club newsletter that best shows the club's activities and energies directed toward the furtherance of the hobby. The award is not based on size or quality of the newsletter, and can be about any aspect of the hobby (F/F, C/L, R/C, boating, cars, etc.). *Model Airplane News* will award two free one-year subscriptions to be given by the club to outstanding members. So send your newsletter to *Model Airplane News*, Club of the Month Contest, 632 Danbury Rd., Wilton, CT 06897.

songs sung by RAF air and ground personnel in World War I, II and between the wars. These hard-to-find lyrics, some of which I hadn't seen or heard in 50 years, have now come to light again. Proceeds from the sale of the books will go to Tangmere Military Aviation Museum, where Eric is a volunteer. Most of us will recall that Tangmere was a fighter base during the Battle of Britain, and many famous squadrons flew from there to meet the Luftwaffe as they flew over the Channel. If you'd like your own copy (for £2, or \$3.25), order direct from Tangmere Military Aviation Museum, P.O. Box 50, Tangmere Airfield, Chichester, W. Sussex P.O. #20 6ER, England.

Jim Gray, c/o *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897.

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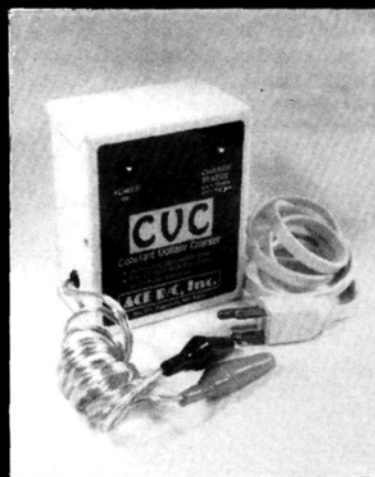
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FOR SALE: *Model Airplane News*, Flying Aces, 1934-1960, others, \$1 for list. Bruce Thompson, 328 St. Germain Ave., Toronto, Ontario, Canada M5M 1W3.

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GIANT HOBBY SHOW December 5-6, 1987, at the new Cincinnati Convention Center, 525 Elm St., Cincinnati, Ohio. Hobby and craft sellers wanted. Low cost selling space is available. The show will feature all types of trains, R/C, crafts, miniatures, and computers. Thousands will attend, noon to six both days. Adults \$4.00. For information contact GATS Ltd., P.O. Box 1745, Lombard, IL 60148 or call (312) 834-0652.

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AIRCRAFT RESEARCH: Need rare aircraft documentation, photos, three-views? Send requests with \$1.50 U.S. for sample information. Mr. I.A. Ross, 1447 Helm Crt., Mississauga, Ontario, Canada L5J 3G3.

WANTED: O&R 19, 23, 29, 60. Thor B. K&B .035 Torp Jr. Prefer original boxes. Speedee Bilt kits. Jerry Jones, 7774 Lewis St., Arvada, CO 80005.

MANY 1/4-SCALE built flying aircraft, excellent quality. Some with engines, some smaller sizes, equipment. Bob Ibanez, 561 Hwy. C, St. Peters, MO 63376, 314-279-1490.

WOODEN HELICOPTER toy soars to 50 feet. \$4.00 plus \$2.00 shipping to Porterbilt Products, 13371 South 2700 West, Riverton, UT 84065.

SALE: Magazines, *RCM*, *M.A.N.*, *MA*, 1975 to 1986. Engines, kits, stamped large envelope brings list. Vincent Pogacnik, 2916 Werner Ct., Lorain, OH 44052, 216-282-6793.

COMING EVENT: 4th Annual Carolina Model & Hobby Expo; static show and swap shop; November 28-29, 1987—Charlotte Merchandise Mart, 2500 E. Independence, Charlotte, NC—1st and 2nd place trophies in 26 categories. Admission \$3.00, ages 6-12 \$1.00, no entry fee for static competition. R/C aircraft, CL aircraft, ships, boats, cars, trains. Contact: Carolina Hobby Expo, 3452 Odell School Rd., Concord, NC 28025; (704) 786-8373.

Send ad and payment to *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897. **Non-Commercial classified ads** (commercial ads of any kind not accepted at this special rate). Rate: 15 words or less, \$4.50 payable in advance. No charge for name and address. Additional words, 25¢ each. **Commercial classified ads** (rate applies to anyone selling on a commercial basis—retailers, manufacturers, etc.). Rate: 50¢ per word, payable in advance. Count all initials, numbers, name, address, city and state, zip and phone number. **Closing Date** for either type of ad is the 15th of the third preceding month (for example, January 15th for the April issue). We do not furnish box numbers. If you would like your ad to run in more than one issue, multiply amount of payment by number of months that ad is to run. It is not our policy to send sample copies or tear sheets.

RAZOR BLADES: Single-edge industrial quality, super sharp. 100/\$4.75, 200/\$9.50, 300/\$14.25, 500/\$23.50, 1,000/\$46.00; add 10% postage west of the Mississippi. Cobble's Gifts, Box 2, Deal, NJ 07723; 201-922-9898.

WANTED: RTF U-Control planes from Cox, Wen-Mac, Comet, Aurora, Testors, etc., complete or pieces, buy or trade. John Fietze, P.O. Box 593, Lynbrook, NY 11563.

ANTIQUE MODEL IGNITION ENGINES—PARTS CATALOG, 50 pages, precision cast timers, original cylinder heads, point sets, drive washers, tanks, for GHQ, O&R, O.K., many others. Large catalog \$4.00 pp. Chris Rossbach, RD 1, Queensboro Manor, Gloversville, NY 12078.

HARDWARE AND SOCKET HEAD cap screws, all sizes, low prices. Write for complete list. Example 6-32x1" only \$4.25 per hundred. Micro Fasteners, P.O. Box 42A, Netcong, NJ 07857.

WANTED: Model airplane engines and model race cars made before 1950. Jim Clem, 1201 E. 10, P.O. Box 524, Sand Springs, OK 74063; 918-245-3649.

BEGINNERS, discouraged by too-fast R/C "trainers"? Send \$1 and a stamp for no-holds-barred evaluation of over 20 well-known models rated for their ease-of-flying. James Waterman, 3818 Deerfield Dr., San Antonio, TX 78218.

BOOKS FOR MODELERS. Out-of-print/current, 400+ items list \$1. John Roby, 3703B Nassau, San Diego, CA 92115.

SCALE DOCUMENTATION: PLAN ENLARGING. Photo packs, 3-views, drawings for 1,600 aircraft. Super-scale R/C plans for Giant, Sport; 43-page catalog \$3. Scale Plans and Photo Service, 3209 Madison Ave., Greensboro, NC 27403; 919-292-5239.

HARRY HIGLEY BOOKS: *There Are No Secrets*—on finishing model aircraft, including paints, adhesives, heat-shrink plastics, shaping, sanding, priming, etc. *Master Modeling*—explains drawing plans, how to scratch-build, use plastics, foam, fiberglass, balsa, and plywood. *Tom's Techniques*—from Tom Ingram, in collaboration with Higley, explains all aspects of finishing a model airplane with iron-on plastic films, step-by-step photos. Special clearance price due to discontinuation of Harry Higley's book line. All books are reduced to \$8.95 each (down from \$10.95), plus \$1.50 postage each. Quantities are limited so act today. *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897.

ENGINE COLLECTORS: Spark ignition and old diesels for sale. Riccardo Taccani, CP59, 6834 Morbio INF Switzerland.

MODEL AIRPLANE NEWS 1986 BOUND VOLUMES: Beautifully and professionally bound in black linen hardcover for your library. Special clearance \$29.95 (regular \$40). Add \$3 for UPS shipment, foreign shipping \$5. Quantities are limited so act today! *Model Airplane News*, 632 Danbury Rd., Wilton, CT 06897.

WANTED: Model engines made before 1950. Don Blackburn, P.O. Box 15143, Amarillo, TX 79105; 806-622-1657.

WANTED: Kits (circa '50 and '60s) from Berkeley, Babcock, deBolt, Veco (U/C and R/C), Monogram (Speedee-Bilts), Scientific. Dr. Frank Iacobellis, 19 Highland Park Place, Rye, NY 10580; 914-967-7763.

CLEARING OUT OLD MAG ACCUMULATION: *M.A.N.*, *A.T.*, *Flying Models*, and others. Send self-addressed stamped envelope for list. Fruciano, 6146 E. Cactus Wren, Scottsdale, AZ 85253.

HOMEMADE FIREWORKS, complete book \$4. Gregg's Books, Box 161, Dimmitt, TX 79027.

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